AUDIT QUALITY IN THE UK

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ABSTRACT

High profile corporate scandals in which blame attaches to the auditors focus global attention on audit quality. Yet empirical academic studies of audit quality are scarce. A low quality audit is not objectively observable unless an extreme event, such as bankruptcy or litigation, occurs. In addition, I demonstrate that the concept of audit quality, as reflected in the literature, is multidimensional, further complicating attempts to measure audit quality. As suggested by theory, I examine whether large (Big 6) audit firms provide higher quality than other audit firms. First, I confirm the existence of large audit firm fee premiums in the UK when the selection of audit firms by clients is taken into account. I next identify some determinants of modified audit reports in the UK, using a large cross-sectional sample. I find no evidence that large audit firms are more likely to issue audit report modifications than other audit firms. Taking earnings management as an alternative measure of audit quality, I then study the impact of audit firm size on earnings management in corporate financial statements. I find that UK companies hiring large audit firms have lower signed discretionary accruals. By identifying discontinuities around earnings thresholds, I also show that earnings management to avoid losses is positively related to signed discretionary accruals. Finally, I find that UK companies hiring large audit firms are less likely to engage in earnings management to avoid losses.

DEDICATION

To my parents, and all my friends who thought I was mad.

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AUTHOR'S DECLARATION

I declare that the work in this dissertation was carried out in accordance with the Regulations of the University of Bristol. The work is original except where indicated by special reference in the text and no part of the dissertation has been submitted for any other degree. Any views expressed in the dissertation are those of the author and in no way represent those of the University of Bristol. The dissertation has not been presented to any other University for examination either in the United Kingdom or overseas.

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CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

1. INTRODUCTION

1.1 The Nature of Audit Quality

Audits are no longer confined to the financial world but are applied with increasing fervour to such diverse areas as education, health, government, and the environment (Power, 1994). Financial auditing has itself developed from an essentially voluntary, individual and untutored activity, to a professionally organised and regulated role which is often a mandatory business requirement. This thesis is concerned with exploring further some of the issues surrounding financial auditing in the UK. In particular, the idea of audit quality: what do we mean by a 'quality audit', and what factors affect audit quality? Attempts to measure audit quality are of particular interest. Audit quality is multidimensional, and (normally) unobservable. It is only when something goes spectacularly wrong, as in the recent cases of Enron and Worldcom in the U.S., that the auditor's work can be criticised.

Consider the level of effort expended by the auditors as one aspect of audit quality. This is not directly observable, unless the audit work is scrutinised during litigation. We may not watch the auditor while she works - it would be prohibitively costly, and there are issues of client confidentiality. Client confidentiality also prevents us from reading the auditor's working papers. Even relying on litigation to reveal audit effort is unsatisfactory as it is a relatively rare event, despite the high

profile of cases such as BCCI and Enron. Auditors may also be sued even when they are not at fault (they have 'deep pockets' and joint and several liability), although we might nevertheless expect that samples of audit work obtained through scrutiny of litigation records will be biased towards low quality.

Even if we could observe audit effort, that in itself would not be sufficient to measure audit quality. Audit quality should depend not only upon the detection of material misstatements in the financial statements, but also upon the reporting of these misstatements once discovered. For the latter, factors such as auditor independence are important. DeAngelo (1981a) defines audit quality as the joint probability that a given auditor will both (a) discover a misstatement, and (b) report the misstatement. Moore and Scott (1988) and Melumad and Thoman (1990) also consider both audit effort and reporting choices in theoretical models of auditing, although other models (e.g. Dye, 1993) do not. Ignoring reporting choices may be a dangerous simplification. Whilst it is clear that an audit report which accurately reflects the findings of incompetent fieldwork may not be safely relied upon, it is also possible that auditors may fail to satisfactorily report the findings of competent fieldwork (*Accountancy*, March 2000, p.96).

However, determining whether audit reports are appropriate or not is also problematic. We may not observe a firm's true financial position and performance, in order to determine for ourselves whether the financial statements it reports contain material misstatements. Nor may we observe the pre-audited financial statements, nor make comparisons between similar companies which are and are not audited, when auditing is mandatory.[1] Any truly satisfactory definition of audit quality will clearly

[1] Audits are voluntary for small, private companies in the UK. In order to satisfactorily compare the financial statements of audited and unaudited UK companies where audits are voluntary, it would be necessary to control for factors affecting the decision to hire an auditor. However, for these small companies, such factors are unlikely to be readily observable. Factors which may be observed or

be multidimensional. Thus, even if we could observe it, it would be hard to find a single measure that would capture the audit quality concept. This is reflected in the audit literature, which employs multiple measures of audit quality. Arriving at an objective measure is also impossible, because of the subjective nature of the audit task.

A financial audit can be defined as the official examination of accounts with verification by reference to witnesses and vouchers, on a sample basis. Its objective is to enable auditors to express an opinion on financial statements and thereby to provide reasonable assurance that they give a true and fair view and have been properly prepared. Therefore, the exercise of professional judgement pervades the audit process. For example, auditors express an opinion not a fact, they must evaluate soft (subjective) evidence as well as hard (for example, relating to the appropriateness of selected accounting policies or management estimates of accruals), and evidence is gathered only on a sample basis, so the auditors must determine the quantity and nature of evidence sought.

It is impossible to avoid subjectivity in the audit process as each audit client is different from the next. Therefore, barriers to entry seek to maintain audit quality in relation to professional judgement – namely, auditors must be highly technically qualified and undergo programmes of continuing professional education. Even if audit clients were identical, we might not wish to remove the scope for professional judgement, as the exercise of professional judgement may enable auditors to signal information to the users of audit reports (Grout et al., 1994).

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proxied, for example, agency costs (arising from the separation of equity ownership from daily control), are unlikely to play a part in demand for auditing among these companies as these companies are likely to be owner-managed. Alternative factors such as the presence of disputes between joint owners, or concerns over financial controls, are more likely to be important but are not publicly available data. Therefore, this thesis does not compare audited and non-audited financial statements for companies that may choose whether or not to have an audit.

Because of these problems, attempts to measure audit quality in the literature are limited. For example, studies seek variously to identify the information content of modified audit reports by analysing their effects on share prices (e.g. Dopuch et al., 1986) and ability to predict bankruptcy (e.g. Lennox, 1999) or the incidence of litigation against the client (Raghunandan, 1993). These studies produce no consistent evidence that audit reports contain information, although there is other evidence to suggest audit quality may differ between large and small audit firms. And yet audit quality is hotly discussed. Auditors are frequently criticised for a perceived lack of independence, producing formulaic and uninformative reports, operating ineffective regulatory and disciplinary schemes, and failing to detect fraud or to warn of impending bankruptcy. High profile audit failures such as BCCI and Enron are seen to damage auditor credibility. In this climate it is important to understand and extend the body of knowledge relating to audit quality.

Reisch (2000) divides the audit quality literature into two major areas – supply-side research and demand-side research. Supply-side research focuses on factors affecting the auditor's ability to supply a quality audit. In contrast, demand-side research focuses on factors affecting the client and audit report users.

Supply-side factors that may influence audit quality include the auditor's ability (for example, knowledge and experience, professional judgement, adaptability, technology), professional conduct (for example, independence, objectivity, conflicts of interest, provision of non-audit services), economic incentives (for example, fees, costs, efficiencies, litigation, reputation), and market structure (for example, competition, industry concentration, economies of scale, regulation). Demand-side factors that may influence audit quality include agency costs, growth, risk, stock-market flotations and the presence of audit committees.

Ronnen (1996) links supply- and demand-side research by arguing that the economic behaviour of participants in the audit market (auditors) affects the scope and precision of financial statements, and the scope and precision of financial statements in turn affect the economic behaviour of participants in the securities market (audit report users). The perceived quality of audits will affect the degree of reliance placed by users on audit reports. The level and sources of demand for audits will in turn influence the quality of audits supplied.

The extant supply- and demand-side audit quality literature is reviewed in this chapter. In particular, the literature which indicates that audit firm size affects audit quality is discussed. Also reviewed is the literature on the information content of audit reports. However, it is important to note that this research must be viewed in the context of the general financial reporting framework. An audit will always be limited by the benchmark to which financial statements are compared – the accounting standards.

As well as leading to concerns over audit quality, the Enron scandal has resulted in a wider debate over accounting standards and financial reporting. Enron's auditors were Arthur Andersen. At the end of 2001, Andersen's former managing partner and CEO Joe Berardino, called for a rethinking of accounting standards in the US to better reflect economic substance over legal form, and to move the financial reporting model away from historical reporting towards reporting more current values (*The Wall Street Journal*, December 4th 2001). More recently, Berardino stressed in an Andersen press statement that 'Enron's collapse was first and foremost a business failure. ... Few people realise that two thirds of Enron's market value was gone before its accounting practices became an issue for the SEC' (Arthur Andersen, January 28th 2002).

These concerns can be related to the 'expectations gap' between the public perception of the role of auditors and scope of the financial audit, and that of the audit profession and the law.[2] Berardino's first concern relates to the public ignorance of the auditor's role in relation to extant accounting practice. The auditor must work within the prescribed accounting framework and is not responsible for the preparation of the accounts which she audits. For the purposes of this thesis, accounting standards are taken as given, and audit quality is interpreted in relation to the identification and reporting of misstatements, where the accounts do not conform to those accounting standards. Whether or not those accounting standards are desirable is outside the scope of the thesis.

However, Berardino's second concern reflects a true expectations gap: the public's belief that an auditor should successfully identify failing companies, whatever the reason for the failure. Bankruptcy is an inherently uncertain event which will not always be predictable, but it is probably reasonable to expect auditors to predict it in many cases. After all, this is arguably the most important information that users of audit reports want to know. Studies of the ability of auditors to identify failing companies are reviewed in this chapter, together with other studies of the information content of audit reports.

1.2 Research Strategy and Plan of Thesis

In addition to this introduction and literature review, the thesis contains four chapters of original work, and a final concluding chapter. The focus of the research is audit quality in the UK. Corporate financial audit is an important and interesting area to research, and one which has lately become very topical. It is important because markets and corporate report users in general depend on the information in financial

[2] For a discussion of the form and history of the expectations gap in the UK, see Humphrey (1997) and Humphrey et al. (1993).

statements, but without independent audit this information may be biased or incorrect. It is interesting because even with an audit, the information may still be biased or incorrect: audits may not be truly independent, or may fail to identify misstatements. Studying the quality of corporate financial audits performed in the UK could enable some of the factors which determine audit quality to be identified. Understanding these factors would be of benefit from a policy perspective. However, as discussed above, the quality of the audit performed is neither captured by any single measure, nor objectively measurable.

Because of the nature of audit quality, I believe that the most tractable approach is to assess relative audit quality between different audit firms (rather than attempt to find an objective measure), and to do so over a range of different possible proxy measures for quality. I have chosen to study audit quality in the UK empirically, analysing large samples of cross-sectional company data with econometric techniques. I focus on the UK as it is the country and regulatory environment with which I am most familiar, and for which I have access to data.

The research topic could have been approached theoretically or empirically. In addition, empirical research may employ a number of different approaches. Constructing theoretical models enables the researcher to abstract from real-world complications and focus on particular relationships of interest, and offers many valuable insights, but is open to criticism for the use of simplifying assumptions. Alternative empirical approaches include the collection and analysis of survey data, and detailed analysis of a small sample of case studies. Survey data allows the analysis of qualitative data and/or data which is not available through commercial sources of company accounts data. However, it is time-consuming to construct surveys, the data is costly to collect, response rates may be low, and responses may be

biased, either because the respondents are self-selected, or because they do not respond truthfully. Case study approaches enable much more detailed study from which to draw inferences than is possible through large-sample approaches, however they are open to criticisms that inferences drawn from a small sample may not be relevant to the population as a whole. For these reasons, I have chosen a large-sample empirical approach.

In order to assess relative audit quality over a range of audit quality proxies, I must first assess whether there is an audit quality differential in the UK. Prior literature suggests that large audit firms may provide higher audit quality than other audit firms. This literature is reviewed in Sections 2.6 and 3.1 of this chapter. One source of evidence for a quality differential between audit firms is audit fees and the large audit firm fee premium. The first piece of original work in the thesis, 'The Large Audit Firm Fee Premium: A Case of Selectivity Bias?' builds on previous studies of audit fees to further examine the large audit firm fee premium in the UK. It is joint work with Clive Lennox (UST, Hong Kong).[3]

The existence of a large audit firm fee premium is often cited as evidence that large audit firms provide higher quality audits. In a competitive market, the fee premium represents a return to higher quality. Alternately, it may indicate market power and have potential competition policy implications. It is therefore important to determine the size of the premium charged by large audit firms in order to assess either the quality differential or the extent of market power. Although I cannot directly test whether the fee premium arises as a result of a quality differential rather than market power, taken together with other evidence (reviewed in Section 3.1) the findings of Chapter 2 support the existence of a quality differential between large

[3] This chapter has been published as a paper in the Journal of Accounting, Auditing and Finance (2002).

audit firms and others, and the subsequent exploration of this differential in Chapters 3 to 5.

Traditional studies of audit fees treat audit firm choice as exogenous. In contrast, Chapter 2 takes into account that companies are not randomly assigned to audit firms. For example, Titman and Trueman (1986) and Datar et al. (1991) present signalling models in which high quality companies prefer high quality auditors. However, high quality companies may require less audit work after controlling for size, complexity and inherent risk. For example, better quality accounting systems or high management integrity may mean that their accounts are less likely to contain misstatements. Auditing these accounts will therefore require less effort and as a consequence will be less costly. In this case, the premium estimated by prior studies will be biased downwards as it will not take account of this reduction in audit cost. Large audit firms' clients will pay lower fees to large audit firms than randomly selected clients would pay to large audit firms. Using UK data, the effect of auditor selection bias on audit fees is shown to significantly underestimate the size of the large audit firm premium. Large audit firms benefit from advantageous selection bias whereas small audit firms suffer from adverse selection bias.

Having confirmed the existence of a large audit firm fee premium in this way, suggestive of a quality differential, I next explore this differential with respect to three different proxy measures of audit quality. Audit quality may be defined in different ways and with respect to different aspects of the audit function. Definitions of audit quality expressed in the literature are reviewed in Section 3 of this chapter. The proxies of audit quality used in this thesis are: audit reports (Chapter 3), discretionary accruals (Chapter 4), and earnings discontinuities (Chapter 5). Overall, the approach

to audit quality taken in the thesis is to focus on the quality of information contained in corporate reports.

In Chapter 3 'Does One Size Fit All? Evidence from a Multinomial Logit Model for Predicting Audit Reports', I use the frequency of unfavourable audit reports to proxy for audit quality.[4] If audit quality is defined as the joint probability that an auditor will both discover and report a misstatement, then, all else being equal, high quality audit firms will be more likely to issue unfavourable audit reports. The purpose of an audit is to enable the auditor to express an opinion which is reported to shareholders (and other users) via the audit report. These reports are the most readily observable aspect of the audit. Prior studies have therefore also used the frequency of modified audit reports issued as a measure of audit quality (e.g. Francis and Krishnan, 1999; Lennox, 2002). However, these prior studies are limited in terms of the types of companies and audit reports studied.

There are four main types of audit reports in the UK. *Clean audit reports* contain no qualification of the auditor's opinion on the financial statements, and are not modified in any other way by the inclusion of explanatory paragraphs. *Qualified audit reports* contain a qualification of the auditor's opinion due to either a *disagreement* (over accuracy or accounting treatment) or a *limitation on scope* (lack of audit evidence). Finally, any audit report may also contain one or more explanatory paragraphs highlighting fundamental uncertainties affecting the accounts, such as those connected with going concern. For the purposes of this thesis, I define a *modified audit report* as any report other than a clean report. Reports with unqualified audit opinions but which contain explanatory paragraphs are classified as

[4] A paper based on the work in Chapter 3, excluding the work on the predictive ability of the model, has been accepted for publication by the Journal of Business Finance and Accounting. This paper is entitled 'An Empirical Investigation of Determinants of Audit Reports in the UK'.

modified, but not qualified, even when the explanatory paragraphs relate to going concern difficulties.[5]

Understanding the factors that lead auditors to issue different types of audit reports will inform discussions of audit quality when measured in this sense. It will also inform studies attempting to evaluate the information content of audit reports. Chapter 3 therefore identifies some of the determinants of modified audit reports in the UK using a multinomial logit model for different modified report types. The model is a multinomial one because three different audit report outcomes are distinguished (a standard logit model would only have two possible outcomes): clean audit reports, going-concern related audit modifications, and non going-concern related modifications.

Distinguishing between different types of modified reports is important as they are assumed to carry different information for users. Some modifications relate specifically to the company's ability to continue as a going concern, whereas other relate to lack of audit evidence or disagreements over accounting treatments or accuracy, which do not affect going concern. A multinomial logit model is used in preference to a multinomial probit model primarily because of computational convenience – the choice of the model is further discussed in Section 3 of Chapter 3.

In addition, in Chapter 3 I assess the multinomial model as a tool for predicting audit reports. Models of audit reporting may be used to predict audit reports. Dopuch et al. (1987) propose several uses of such a model: audit firms would be able to use it to screen potential clients or in peer review, the courts would be able to use it as a benchmark in cases of auditor negligence, and researchers would be able

[5] The form and wording of audit reports in the UK is governed by Statement of Auditing Standard (SAS) 600. In 1993, SAS 600 replaced the previous 'subject to' audit qualification relating to going concern with the fundamental uncertainty paragraph which explicitly does not constitute a qualification.

to use it to assess the extent to which audit reports are expected in tests of market efficiency or the information content of audit reports. The extent to which audit reports carry incremental information to users is likely to be inversely related to how predictable audit report types are.

Chapter 3 follows the methodologies of Dopuch et al. (1987) and Monroe and Teh (1993) in assessing the audit reporting model's predictive power, but it is the first time that a multinomial model (as opposed to a standard binary model) of audit reporting has been assessed in this way. It is also the first time that a study has examined audit reporting outcomes on both public and private UK companies, and has analysed both going-concern and non going-concern related modifications.

The cross-sectional sample analysed in the chapter consists of 9,304 companies with the most recent accounting period ending 30 April 1998. Of this sample, 7,125 received clean reports on the current financial statements, 431 received going-concern related modifications, and 1,748 received non going-concern related modifications. 8,289 companies are private, and 1,015 companies are public, of which 374 (4%) are listed.

Chapter 3 provides evidence that the determinants of audit reports differ between different types of audit report modification. For example, I show that subsidiary companies are significantly less likely to receive non going-concern related audit modifications than independently owned companies.

I also show that public non-listed or listed companies are no more or less likely to receive any type of audit modification than private companies after controlling for other observable company characteristics. This is interesting because with greater separation of ownership from control, one might expect public or listed companies to face more stringent audit reporting behaviour. It is possible that

improved governance among such companies improves their corporate reports, mitigating this effect. I am unable to control for many aspects of the governance context. This is discussed in more detail in Section 4.

When assessing the ability of the model to predict audit reports, I find that the multinomial logit model only marginally reduces prediction error costs relative to a standard logit model or a naïve prediction rule. This is likely due to the strong persistence in audit reporting observed in the data, which is the basis of the naïve rule.

In regard to assessing the audit quality differential between large audit firms and others, Chapter 3 shows that clients of large audit firms are significantly less likely to receive non going-concern related audit modifications than clients of other firms, but that audit firm size has no effect on going-concern audit modifications. If corporate report quality and corporate going-concern does not vary systematically with chosen audit firm size, one would expect large audit firms' clients to receive more modified audit reports (of both types) than other firms' clients. Either the hypothesised audit quality differential does not exist, which does not seem likely given supporting evidence, or corporate report quality and going-concern varies systematically with chosen audit firm size. This latter could arise both because (i) audit firms influence corporate report quality (a measure of audit quality) and (ii) audit firms are selected by the companies that they audit.

The selection of audit firms by their clients was controlled for in Chapter 2 using a Heckman selection model. However, I cannot control for it in Chapter 3, although large audit firms' clients may produce higher quality corporate reports and therefore be less likely to require audit modifications. For a Heckman-type selection model to be identified, at least one variable must be included as an explanatory variable in the auditor choice model but not in the subsequent (reporting) model.

Director affiliations with audit firms are thought (and found) to be significant determinants of audit firm choice, and in Chapters 2 and 4 serve to identify the selection model. However, most of the companies analysed in Chapter 3 are not listed so data on director affiliations to audit firms is not available. I cannot confine my study in Chapter 3 to listed companies only, as my sample would not include sufficient audit report modifications. Furthermore, director affiliations with audit firms may influence audit reporting as well as audit firm choice, as auditor independence may be compromised, hence these variables should be included in both stages of the selection model and the model would no longer be identified. This is why I do not control for the endogeneity of the audit firm choice in Chapter 3.

I therefore test whether there is an audit quality differential with respect to corporate report quality in Chapters 4 and 5, using discretionary accruals (Chapter 4) and earnings discontinuities (Chapter 5) as proxies for corporate report quality (and hence audit quality). Discretionary accruals and earnings discontinuities are both indications of earnings management, and high quality corporate reports are defined as those in which (income-increasing) earnings management is not undertaken. In these chapters I confine my study to listed companies, so that I can treat the audit firm choice as endogenous using a selection model. I can do this not only because data on director affiliations is available, but because there is no reason to believe that director affiliations affect the degree of earnings management in the corporate reports.

In Chapter 4 'Are Large Auditors More Conservative? Earnings Management and Auditor Choice in the UK', I examine whether the clients of large audit firms create fewer income-increasing discretionary accruals than the clients of small audit firms. This is an indirect examination of audit quality, which takes account of the influence of the audit on financial reporting through its impact on the behaviour of

management, rather than directly via the audit report. The chapter uses reported discretionary accruals as a measure of earnings management, estimated using a cross-sectional version of the modified Jones model after Dechow et al. (1995) and Jones (1991).

The degree of earnings management activity engaged in by a company in preparing its financial statements, may indicate both management's quality, and that of the auditor. For example, Nelson et al. (2000) survey auditors working for an (anonymous) Big Five audit firm to examine managers' decisions to attempt earnings management, and auditors' decisions to waive or reject such attempts. They find that 60% of earnings management attempts (EMAs) are income increasing, and that in 43% of EMAs, the auditors require adjustment. Auditors are found to be most likely to waive adjustment of an EMA when it decreases current-year income, is governed by an imprecise accounting standard or is structured to meet a precise standard, is considered immaterial, or is attempted by a large client. Note that discretionary accruals generated by Jones-type models are estimated by reference to published financial accounts data. Therefore these discretionary accruals will not include EMAs which have been adjusted by the auditors.

Earnings management can be defined as the presentation of financial performance in a favourable light that does not necessarily reflect the underlying reality. For example, earnings may be managed by adopting inappropriate accounting policies and/or by unduly stretching judgements as to what is acceptable when forming accounting estimates. Earnings management practices are receiving considerable attention in the UK at the time of writing. Discussion papers on revenue recognition and aggressive earnings management have been issued by the Accounting Standards Board (ASB) and Auditing Practices Board (APB) respectively. Where

aggressive earnings management results in financial statements that do not show a true and fair view, auditors are required to qualify their audit opinion (for a disagreement) unless management restate those financial statements prior to publishing. *Ceteris paribus*, a higher quality auditor (who is more likely to discover misstatements and/or to prevail upon management to amend the financial statements) may therefore be associated with lower levels of earnings management in financial statements. Large audit firms are expected to be higher quality in this sense as they have more reputation and/or wealth to lose from litigation or criticism as a result of audit failure (see Section 3).

Alternately, (for the same reason) large audit firms may be more likely to issue audit modifications when earnings management occurs. Bartov et al. (2001) find a positive association between DA and audit report qualifications. Francis and Krishnan (1999) compare audit report modifications issued by large and small audit firms, and find that large audit firms are more likely to issue modifications when they report on companies with high values of income-increasing accounting accruals.

Prior research on the impact of audit firm size on the level of reported discretionary accruals shows that companies which hire large audit firms report lower levels of income-increasing discretionary accruals than other companies (Francis et al., 1999; Becker et al., 1998). But companies self-select auditors, so it is potentially invalid to conclude from this research that large audit firms are higher quality in the sense that they restrict potentially misleading reporting. In particular, Becker et al. (1998) note that it is possible that 'non-Big 6 audit firms are preventing a higher proportion of unwarranted accruals, but their clients have relatively higher levels of pre-audit earnings management' (p.21). Similarly, Francis et al. note that 'it is

possible that [Big 6 and non-Big 6 audited companies] may differ from each other in ways that systematically affect the estimation of expected accruals' (p.30).

Francis et al. find that large audit firms' clients have higher levels of total accruals. Total accruals are the sum of discretionary and non-discretionary accruals. They also find that companies that have greater propensity to generate accruals, as measured by the length of the operating cycle, and capital intensity, are more likely to hire large audit firms. If this implied that companies hiring large audit firms reported higher values of discretionary accruals than other companies in their pre-audited accounts (unobserved), it would suggest that previous studies of audit firm size and discretionary accruals may underestimate the quality differential between large and small audit firms.

However, because theory suggests that large audit firms' clients are higher quality (Titman and Trueman, 1986; Datar et al., 1991), large audit firms' clients may instead share (unobservable) characteristics which are associated with low levels of discretionary accruals in the pre-audited accounts. Even if, because of the nature of their business or their size, they may have greater opportunities to generate accruals, they may choose not to. Examples of such characteristics would include a high degree of management integrity or successful corporate governance monitoring systems. In this case, prior earnings management studies would overestimate the audit firm quality differential. Companies with greater opportunities to generate discretionary accruals may choose large audit firms because they wish to signal they are high quality and have therefore *not* made large discretionary accruals in their pre-audited accounts (Francis et al., 1999). Client characteristics, rather than constraining actions on the part of large audit firms, may be responsible for the observed differences in discretionary accruals.

By controlling for the auditor choice in a two-stage selection model similar to that employed in Chapter 2, I distinguish auditor characteristics from unobserved client characteristics which affect the reporting of discretionary accruals. I show that large audit firms are more conservative in their reporting of signed discretionary accruals. On average, companies report lower levels of signed discretionary accruals with large audit firms than with small audit firms. However, I find no evidence that large audit firms are associated with lower levels of absolute discretionary accruals.

I also show in Chapter 4 that clients of large audit firms report higher levels of signed discretionary accruals with large audit firms than the average company would with large audit firms. Furthermore, when analysing positive and negative discretionary accruals separately, I show that clients of small audit firms report less positive DA with small audit firms than other companies (clients of large audit firms) would. This would be consistent with the argument of Francis et al., that companies hiring large audit firms share characteristics that are associated with high levels of discretionary accruals, if these companies also chose to generate such accruals. However, this would not be consistent with the arguments presented in theory and in Chapter 2, that large audit firms' clients are higher quality, if such accruals are undesirable and require expensive audit effort. As I am also unable to replicate Francis et al.'s results concerning the influence of operating cycle and capital intensity on the auditor choice decision, it is likely that there is an alternative explanation for this result.

High quality clients are not necessarily associated with low earnings management unless earnings management is undertaken for opportunistic reasons, for example to increase managerial compensation. Managerial accounting choice may alternately be exercised to convey private information to investors (Fields et al.,

2001). As auditors may share or at least partly observe manager's private information, or possess independent private information on the quality of their clients, they may allow 'good' clients to report higher signed discretionary accruals than the average client. In this way, large audit firms may signal that their clients are higher quality. Similarly, small audit firms may constrain their clients' use of discretionary accruals more than they would the average client, to signal that their clients are lower quality. The possibility that auditors may signal private information in this way is discussed further in Section 3.3.

The final chapter of original work, Chapter 5 'Earnings Management and Auditor Choice: Further Evidence from Earnings Discontinuities', provides additional evidence in support of the results reported in Chapter 4. However, in contrast to Chapter 4, earnings management is not measured in terms of discretionary accruals. Instead, the methodology is to examine the cross-sectional distributions of earnings and earnings changes in the sample. Prior research on earnings discontinuities notes that unusually low frequencies of small losses and small decreases in earnings (relative to prior year earnings and to forecast earnings) occur, coupled with unusually high frequencies of small positive incomes and small increases in earnings (Burgstahler and Dichev, 1997; Degeorge et al., 1999).

Chapter 5 provides evidence of a similar earnings discontinuity around the threshold of zero earnings, but finds no evidence of a discontinuity around the threshold of zero change in earnings relative to the prior year. For companies which fall into 'suspect' categories for earnings management to meet the threshold of zero earnings, I show that these companies are significantly more likely to be audited by small audit firms than other companies. In addition, I show that the signed discretionary accruals calculated in Chapter 4 are positively associated with

membership of these 'suspect' categories. This suggests that discretionary accruals are indeed associated with earnings management attempts.

The final chapter of the thesis summarises the results and conclusions of the four chapters of original work, and suggests policy implications and directions for future research.

The remainder of this chapter reviews areas of the academic background which are most relevant to the work presented in this thesis. Section 2 discusses the demand-side literature relating to audit quality, and describes and explains sources of demand for audits. Section 2 also discusses the market for supply of audits. Section 3 discusses the supply-side literature relating to audit quality, and studies related to testing audit quality including tests of the information content of audit reports. Section 4 concludes.

Extant literature which is directly relevant to the original work in the thesis is reviewed in more detail in the appropriate chapters. However, the discussion here of sources of demand for audits is particularly relevant to the models of auditor choice which are applied to control for auditor self-selection in Chapters 2 and 4.

2. DEMAND FOR AUDITS AND THE AUDIT MARKET

Sources of demand for audits are important for the research presented in the thesis. In particular, they are important for the models of auditor choice presented in Chapters 3 and 4. Issues surrounding auditing are better understood by understanding the factors that give rise to auditing in the first instance. Demand-side factors are also important influences on audit quality. It is reasonable that factors influencing the demand for audits when auditors are identical will also influence demand for audits from high (as opposed to low) quality audit firms when audit quality is differentiated.

Research indicates that the main sources of demand for audits are stewardship (monitoring), signalling, insurance, and the provision of services to management. These are discussed in turn below. The final subsections discuss the audit market and the pricing of audit services. Demand for audits will interact with supply and provide a link via audit pricing between the demand- and supply-side literature on audit quality. For example, audit fees are believed to influence the quality of audits supplied. In particular, low fees, especially fees that are below cost ('lowballing'), are popularly believed to adversely affect audit quality, despite arguments to the contrary (e.g. DeAngelo, 1981b).

2.1 Stewardship

Possibly the most important source of demand for audit services is stewardship or monitoring. This role for the audit is an effort to resolve the moral hazard problem inherent in the agency relationships of the firm (explained below). The statutory audit requirements in the UK were first introduced for such purposes. Throughout the eighteenth and nineteenth centuries, incorporation led to the increasing separation of the ownership of businesses from their day-to-day control. Following the birth of the limited liability company, the Companies Acts introduced mandatory auditing requirements for the protection of investors.

The original motivation for mandatory auditing was to protect *all* investors, including those sufficiently removed to be unable to impose an audit requirement directly on the firm, for example minority shareholders, lenders, and suppliers. Therefore, throughout the nineteenth century the auditor was regarded as the guardian of the interests of all parties (Woolf, 1997). However, the responsibilities of auditors have since been refined and developed by case law. In recent years auditors in the

UK have been held to hold a 'duty of care' to only a limited class of potential litigants – essentially existing shareholders as a class - and only in limited circumstances.[6]

The moral hazard problem inherent in the firm is that the agents who are entrusted to run the business have interests of their own which may not coincide with those of the principal(s), and their actions after hiring may not be contractually enforced. Shareholders (the principal) who are not management active therefore require protection from management (the agent) who may prefer to spend on benefits for themselves than to invest in worthwhile projects, or if effort is costly, to shirk rather than work.

In an ideal world, contracts would be written between the shareholders and management to prevent this conflict of interest. However, it is not possible to write a legally enforceable contract to ensure management effort, because management effort is likely to be both unobservable (or at least prohibitively costly to observe) and unverifiable by shareholders. Management effort will be unobservable if the shareholders are physically remote from the business. Distant shareholders may only observe company performance as reported in the financial statements, but this is not verifiable because the financial statements are prepared by management so may be biased in management's favour. Even if they are physically on site to access the accounting records, the information in financial statements is complex, and shareholders who lack the necessary skills will still be unable to verify it.

[6] The purpose of a statutory audit, under the current Companies Act, has been most famously interpreted by the courts in *Caparo Industries v Dickman and Others* (1990). This case essentially confined the class of potential litigants in a negligence suit to existing shareholders, as a body, suffering loss as a result of relying on the audit report to make stewardship decisions. The courts currently apply a tripartite test to determine whether a defendant owes a duty of care to any other potential litigant, the conditions of which are hard to meet (Woolf, 1996). In March 1998, the Department of Trade and Industry launched a review of core company law which has proposed that auditors' duty of care be widened to include shareholders who rely on audit reports to buy or sell shares, and to creditors and potential investors (third parties); however this has since been rejected as unworkable in practice. Furthermore, audit firms may now incorporate as either limited companies, or limited liability partnerships, reducing the extent of their liability still further.

Furthermore, even if shareholders could perfectly observe and verify company performance in order to try to measure management effort, management effort is not the only factor which affects company performance. Secondly, it is hard to imagine being able to specify all possible actions and contingencies that may arise in any single contract, even if everything was observable and verifiable. Shareholders therefore have incentives to hire (skilled and independent) auditors to monitor management on their behalf.

Audits are therefore demanded to fulfil a stewardship, or monitoring function, when there is moral hazard. To summarise, conflicts of interest between an information preparer such as a director, and an information user such as a shareholder, can result in biased information production. This in turn can lead to a demand for auditing to ensure that the information produced is unbiased. In particular, this demand will arise when the information is complex, requiring expertise for verification (for example, financial statements based on underlying accounting records), and/or where users are sufficiently remote to prevent themselves from directly assessing the quality of the information (for example, minority shareholders in a multinational corporation). The problem, of course, is that the auditor is also a self-interested economic agent. Therefore the auditor also faces an effort choice, leading to further moral hazard.

There is empirical evidence to support the importance of monitoring as a source of demand for audits. Agency cost considerations arising from conflicts of interest between management and shareholders (and lenders) have been shown to play an important part in the demand for audits where there are no compulsory audit requirements (Chow, 1982). Chow conducted empirical tests of the variables which proxy for agency costs. His results support the positive influence of leverage

(gearing) and the presence of accounting-based debt covenants on the decision to hire an auditor, and provide some evidence for the influence of firm size (also positive). The effects of manager share ownership, which is predicted to reduce the demand for auditing, could not be tested due to data limitations.

Where audits are mandatory, agency sources of demand for audits may play a part in demand for high quality auditors rather than low quality auditors. For example, DeFond (1992) found that changes in institutional ownership and leverage are positively associated with changes in audit quality. In Chapters 3 and 4, models of auditor choice are estimated in order to control for unobservable client company characteristics that are expected to be associated with, respectively, audit fees and earnings management. Two proxies for agency costs are used in these models – financial gearing (leverage), and the proportion of non-executive directors on the board. Gearing is not found to be significant in determining chosen audit firm size, however companies with relatively high numbers of non-executives (high demand for monitoring) are found to be significantly more likely to hire to large audit firms.

In the UK, under the Companies Act, audits are mandatory for the majority of companies. Audits are compulsory for all public companies and for certain companies (private or public) whose area of business is deemed to be in the public interest. Exemptions are only available for very small private companies. For the date of the company year-ends used in this thesis, the general requirements that a private company must have met in order to qualify for an audit exemption were that the company must qualify as 'small' for the purposes of filing abbreviated accounts, must have turnover of no more than £350,000, and must have total assets of no more

than £1.4 million.[7] To protect minority interests, ten percent of ordinary shareholders may still require the company to have an audit even if it meets the exemption criteria.

The demand for auditing for stewardship purposes is unlikely to exist where companies are owner-managed, unless there are outside minority interests. This is the rationale for the small private company audit exemption in the UK. Demand for auditing from companies meeting the audit exemption requirements may also arise if there are disputes between joint owners, or for general managerial purposes. For example, audits may provide compensatory control systems (Abdel-Khalik, 1993).

2.2 Signalling

The agency-cost arguments for auditing arising to solve moral hazard problems can also be applied to adverse selection. Audits may be demanded as signals of management, company or shareholder quality to counter adverse selection problems. These arise because different parties have different information. For example, investors may be unable to distinguish high quality securities (shares in high quality businesses) from low quality securities before they buy them, whereas the current owners of the securities will know something about their type.

In this situation, market prices will simply reflect the average expected quality of securities. Sellers of high quality securities will not wish to sell at this price (they know that their securities are worth more) and will withdraw from the market; only low quality securities (which are worth less than the average sales price) will remain in the market. To counter this adverse selection, owners and managers of high quality businesses may engage in signalling.

A signal is an activity that would be irrational were the signaller's claims of type (i.e. high or low quality) incorrect. As audits are costly, one signal available to a

[7] At the time of writing, the turnover limit has been increased to £1 million and there are indications that it may be further raised to the maximum currently allowed under EU law, namely £4.8 million.

manager is to hire an auditor (where audits are not mandatory) or to hire a higher quality auditor (where audits are mandatory). Audits are costly both because a fee is paid, and because the auditor may uncover and report information that a manager would wish to remain undiscovered.

For example, shareholders may protect themselves from self-interested management without audits, by reducing remuneration according to the expected level of wealth management will seek to transfer to themselves. Now a demand for auditing may arise from management themselves, if the value of the foregone remuneration would exceed that of the wealth transfer gained and the cost of the audit (Evans, 1980). Management would wish to demonstrate their good performance by hiring auditors to attest to it, and so maintain their remuneration.

Similarly, shareholders may have incentives to hire auditors to demonstrate their good performance to non-shareholder investors. As shareholders have only limited liability for business losses, non-shareholder investors such as trade creditors and bondholders, whose interests may not coincide with those of the shareholders, require protection from the shareholders in the event that a business cannot repay its debts. For example, in investment and asset substitution problems, once investors have purchased bonds, shareholders' actions are not observable or verifiable by the bondholders. Shareholders, or managers as their representatives, choose which projects (assets) to invest in subsequent to receiving the bondholders' consideration. As their choice is unobservable or unverifiable, they may choose projects which benefit themselves at the bondholders' expense, thereby transferring wealth from the bondholders. As non-shareholder investors cannot require the company to have an audit, the bondholders may protect themselves by reducing the market price of bonds.

To avoid this, shareholders may hire auditors, if the benefits in terms of higher bond prices exceed the costs of the audit and the wealth transfer foregone.

In many signalling models of auditing the auditor is treated as a machine (e.g. Bar-Yosef and Limat, 1984; Titman and Trueman, 1986; Datar, Feltham and Hughes, 1987). In other words, the actions (e.g. effort choices) of the auditor are not modelled but simply taken as given. In contrast, Melumad and Thoman (1990) incorporate a utility-maximising auditor as found in agency models into a simple signalling setting. The auditor chooses effort and reporting strategies in order to maximise her expected utility. In their paper, firms with unobservable risk-types requiring loans choose whether or not to hire auditors. If they hire an auditor, firms disclose (possibly false) information about their type to the auditor which is unobserved by the lender, the auditor chooses effort level and whether to report audit findings truthfully, and both the firm and the lender may sue the auditor.

The adverse selection problem arises because the (ex ante) project risk is unobservable - 'good' firms become bankrupt less frequently than 'bad' firms, but lenders cannot tell who is 'good' and who is 'bad' although they must price loans according to their assessments of the probability of being repaid. Hence firms choose (i) whether to hire an auditor; and (ii) what information to provide to that auditor if the auditor is hired. The idea is that firms may hire auditors to provide information to lenders about their types (good or bad).

There is also a moral hazard problem because, unless disciplined, the auditor would choose not to expend costly effort, making the audit report useless. This is why the model allows the firm and the lender to sue the auditor for a perceived audit failure. The threat of litigation may induce the auditors to work and truthfully report their findings, in order to pay less damages. Alternately, or in conjunction, potential

reputation losses may act to ensure audit effort and truthful reporting (see e.g. DeAngelo, 1981a; Firth, 1990; Wilson and Grimlund, 1990; and Datar and Alles, 1999).

When the auditor is assumed to always work and report truthfully (i.e. is treated as a machine), and audits are optional, Melumad and Thoman find there are separating equilibria where only good firms hire auditors. An auditor will always discover and report a firm's true type, and is therefore only worthwhile for good firms. However, Melumad and Thoman also show that, when the auditor is strategic (i.e. allowed to choose effort and reporting strategies), *fully* separating equilibria no longer exist. This should not be surprising. Bad firms may also hire auditors if auditors do not always expend effort and/or report truthfully – they may successfully masquerade as good firms.

Although the paper primarily concerns a non-mandatory audit setting, the authors also consider mandated auditing in a regulated setting. When audits are mandatory, the authors conclude that the signal provided by firms' choices as to whether or not to hire an auditor is lost. However, there do exist equilibria in which auditing is effective (i.e. audit effort is expended and reporting is truthful). Melumad and Thoman also show that, for these equilibria, an increase in the auditor's damage payment raises the 'bad' firms' expected borrowing costs while reducing the 'good' firms' expected costs, even though auditors charge both firm types the same fee. In other words, borrowing costs are more appropriately assigned.

Also within a mandatory audit setting, the authors consider what impact changes in audit accuracy (defined as the probability z that a false message will be found) have on the equilibria of the model. They find that when the auditor's damage payment is large and z is close to 1, increases in accuracy raise the good firms'

expected borrowing costs and lower the bad firms' expected borrowing costs. This is undesirable - in other words, auditors can be too accurate!

Melumad and Thoman view all auditors as identical. If, however, some auditors are higher quality (more accurate and/or more credible - and more expensive) than other auditors, then choosing a higher quality auditor rather than a lower quality auditor may still signal firm type successfully even in a mandatory setting (Titman and Trueman, 1986). For example, large audit firms are often regarded as providing higher quality than other audit firms (see Sections 2.6 and 3.1 below). A limitation is that Titman and Trueman take auditor quality in their model as given (and verifiable), and do not allow auditors to act strategically. Obtaining model equilibria is unlikely to be (computationally) straightforward if a model includes multiple auditor types who are allowed to act strategically (Antle, 1982).

2.3 The Auditor as Insurance

A third source of demand for audits could arise as a result of their risk-sharing abilities. The auditor shares joint and several liability with company directors for the contents of the published financial statements. Employing an auditor therefore shares the litigation risk between management and the auditor. This may make risky enterprises more attractive to managers who may otherwise refuse employment, or to third party investors who doubt the ability of the business and/or management to pay damages.

It is not only management or third parties who may benefit from risk-sharing with an auditor; Antle (1982) developed a game theoretic model in which the auditor acts as insurance for risk-averse shareholders. Individual managers are unlikely to have sufficient funds to meet plaintiffs' claims, and the client companies themselves

may be insolvent. In contrast, the 'deep pockets' of auditors are frequently cited as the reason they are often the first targets in a suit.

A belief that auditors *should* insure investors against market losses was expressed in the US case of *Rosenblum v Adler* (1983). Lys and Watts (1994) investigate the significance of market returns in explaining the incidence of auditor litigation in the US between 1955 and 1994. They find some evidence that client firms involved in law suits had lower stock market returns than other firms over the period as a whole. They also test whether the *Rosenblum* decision increased the probability of an auditor lawsuit by examining whether other explanatory variables, not related to investor losses, are less important in the period following the *Rosenblum* case. Lys and Watts find that some variables do become less significant, and interpret these results as supporting insurance as a consideration in auditor litigation. However, in her discussion of the paper, Francis (1994) points out that if the insurance hypothesis were literally true, then auditors would always be included as a defendant in relevant litigation, when in fact they are not. She also points out that a less extreme, but untested, implication of the hypothesis is that the incidence of litigation against auditors in the US could be expected to increase following the Rosenblum decision. Francis proposes that a test of the hypothesis would therefore be to examine whether lawsuits which name the auditor as a defendant increased as a percentage of total lawsuits.

The usefulness of auditor liability to third parties seeking to rely on financial statements depends on the extent of the auditor's duty of care, which is heavily restricted in the UK. A question also remains as to why managers would look to the auditors for insurance, rather than or in addition to a conventional insurance company. Wallace (1980) suggests that auditors may provide managers with more effective

protection against liability claims than a conventional insurance company, because both auditors and managers attach value to reputation (Fama, 1980). Enjoining the auditor in the defence of allegations in which the manager is implicated increases the probability that the manager will emerge with reputation intact or with less damage suffered. Furthermore, unlike other types of insurers, auditors can actively avoid payments by expending effort (and reporting truthfully) or by reporting conservatively (i.e. always modifying their reports). This may be one reason why auditors could be preferred to other insurers – they are likely to be cheaper as a result. Furthermore, it may be difficult to find other insurers willing to take on all the risks associated with investment in businesses.

Antle (1982) shows that, in his theoretical model, the auditor will prefer risk-sharing providing he or she is sufficiently compensated for the risk borne. However, Bockus and Gigler (1998) provide an auditor switching theory which argues that incumbent auditors face an adverse selection problem with respect to liability risk. In their model, if the expected liability to the incumbent auditor is sufficiently high, any attempt by the incumbent to compensate her expected liability with the audit fee will result in a good client switching to a (cheaper) auditor but a bad client retaining the incumbent.

Bockus and Gigler assume that successive auditors are always cheaper because they have less information about the risk posed by any individual client. Pong and Whittington (1994) find evidence in the UK that new auditors charged less, on average, than continuing incumbent auditors, although this could alternately be explained by the practice of 'lowballing' (see Section 2.7). If auditors are unable to compensate themselves for liability risk, this would suggest that Antle's argument does not hold when incumbent and successive auditors are differentiated.

2.4 A Service to Management

Finally, management may also benefit from audits as a check on the adequacy and operation of the internal controls of the company. For example, auditors provide a 'management letter' to client directors in an advisory capacity, detailing shortcomings in the accounting systems and controls of the client company and suggestions for improvement. Hence audits may be viewed as providing a service to management (Turley and Cooper, 1991). Abdel-Khalik (1993) also argues that audits may provide a compensatory control system. More recently, Gwilliam (2002) argues that the new business risk audit methodologies more closely align the auditor and client management, as a concentration on 'adding value to the client' effectively transforms the audit role into a consulting role.

The audit may, in particular, serve as an important fraud detection (or deterrence) service. This is not distinct from the auditor's duty to report on the truth and fairness of the financial statements - the auditor is expected to undertake to plan the audit so as to have a reasonable expectation of detecting material misstatements, whether caused by fraud or other irregularity or error. Despite this, auditors' abilities to detect fraud are often called into question. For example, Woolf (1996) reports statistics provided by the professional indemnity insurance provider Bowring Finpro that show claims related to failure to detect defalcations exceed those arising from all other audit work, in both incidence and monetary amount. However, such evidence alone cannot show whether audits are successful at detecting or deterring fraud. Incidences where fraud has been successfully detected are not reported, let alone incidences where it has been deterred, so we cannot rely on claims evidence to draw conclusions about auditors' abilities in this respect.

2.5 *The Supply of Audit Services*

The different sources of demand for audits may all influence audit quality. Supply-side characteristics also influence audit quality. Supply-side audit quality research explores the economic characteristics of the audit firms themselves, and the markets in which they operate. Demand for audits will interact with the supply of audits through market mechanisms. If the structure of the audit market is highly competitive, commercial pressures may influence the quality of service provided by lowering fees. Alternately, if the market is dominated by just a few suppliers (e.g. the Big 6), they may be able to exercise considerable market power, for example they may charge fee premiums.[8]

In October 2000, *Accountancy* published research that showed that the Big 5 accountancy firms audited all of the FTSE top 100, and that other firms audited only 17 out of the FTSE 350 (4.9%). In a recent report, 'Restrictions on Competition in the Provision of Professional Services' for the Office of Fair Trading (December 2000), LECG Ltd found that, in 2000, the Big 5 had a market share of 79.2% in accountancy services as a whole.

There is therefore a high degree of supplier concentration in the listed market - a relatively small number of audit firms account for a significant proportion of the total volume of audit work being carried out. Dominance of the market by the Big 5 audit firms could be an oligopoly. This could lead to a sub-optimum allocation of resources and internal inefficiencies, because the decisions taken by one supplier will be heavily influenced by the possible reactions of that supplier's few competitors. It

[8] The Big 6 are Arthur Andersen, Deloitte and Touche, Ernst and Young, KPMG, Price Waterhouse and Coopers and Lybrand. In 1998, Price Waterhouse and Coopers and Lybrand merged to form PriceWaterhouseCoopers, reducing the large audit firms to a 'Big 5'. Following from the scandals in 2002 involving Arthur Andersen (e.g. Enron), and this firm's subsequent collapse, there is now a 'Big 4'.

is generally argued that in these circumstances, the suppliers will adopt some form of (perhaps implicit) collusion (Moizer and Turley, 1989).

Research in the UK shows a pattern of increasing concentration over the past thirty years or so (Pong and Turley, 1997). Pong and Turley argue that the underlying reasons for the use of larger audit firms could include the quality of service provided and the credibility thus obtained, good marketing, or the increasing globalisation of the top UK clients (who may therefore require a global accountancy firm). They conclude that the increases in concentration appear to have come about mainly through mergers between audit firms (most recently, the merger of Price Waterhouse with Coopers and Lybrand in 1998).

This may not be the only reason that large audit firms dominate the audit market. Accountants are prohibited from seeking the business of potential clients by telephone and from comparative fee advertising (ICAEW handbook 2000; ACCA Guidelines). There is evidence that this may restrict competition by smaller firms for the custom of smaller businesses and individuals or smaller clients.

There are also barriers to entry in the audit market - initially, these concern the technical qualifications and other requirements to be an auditor, which effectively provides accounting firms with a legal monopoly over audits. The justification for these barriers is to ensure audit quality, but they may also be considered restrictive practices. Indeed, the accountancy profession is identified in an Office of Fair Trading report 'Competition in Professions' (OFT, 2001) as one in which restrictions on supply operate. Effective barriers to entry may also arise from the existence of economies of scale and scope (e.g. developing in-house audit software and training materials, or offering a wide range of services under one roof).

These restrictions may be justified, if knowledge of accountancy and compliance with auditing standards ensures audit quality. Barriers to entry may also help to ensure a high standard of professional judgement (and hence audit quality). These considerations are important as consumers of audits include the public, who have no direct control over hiring and remuneration of auditors, not just the customer (the firm) who pays for them.

2.6 Pricing of Audit Services

Audit fees vary considerably from one client company to the next. It is of interest to know what determines the prices charged for audit services, and what constitutes value for money in audit fees. Studies of audit fees may shed some light on questions concerning audit quality. In particular, fee premiums are often cited as evidence that certain auditors provide higher quality. Furthermore, unusually high or low fees may indicate a lack of auditor independence. At one extreme, high fees may represent a reward to the auditor in return for reporting favourably. Alternately, low fees in one period ('lowballing') are widely believed to increase auditor reliance on client retention in future periods. However, DeAngelo (1981b) points out that this is not a rational belief, as low fees in one period are sunk from the perspective of future periods (lowballing to obtain new clients is discussed in more detail in Section 2.7).

Ignoring independence issues, the main factors likely to influence audit fees are those that determine the amount of audit work that will be performed (e.g. client size, complexity, control and inherent risk, or the presence of certain assets or liabilities that require particular efforts or expertise to verify). In addition, if large audit firms provide higher quality in some sense (e.g. do more work, are more likely to report consistently with their findings, provide a better or additional service to management, or simply employ better trained or qualified personnel) or have market

power, they may charge a fee premium. For example, there have been several empirical studies of the determinants of audit fees which show, after controlling for client characteristics, that large audit firms tend to receive higher fees than small audit firms (e.g. Simunic and Stein, 1987; Beatty, 1989; Chan et al., 1993; Craswell et al., 1995; and Pong and Whittington, 1994).

Chapter 2, 'The Large Audit Firm Fee Premium: A Case of Selectivity Bias?' builds on these studies of the large audit firm fee premium. Previous studies treat the auditor choice as exogenous. However, if large audit firms are higher quality in terms of accuracy, then companies choosing large audit firms are likely to share characteristics, such as a low risk of misstatements occurring in the financial statements, that are also associated with lower audit fees. The premium estimated by prior studies is therefore likely to be biased downwards. By controlling for the endogeneity of the auditor choice, this chapter finds that the true premium is more than twice as large as previously thought.

2.7 Lowballing

Auditor independence, and hence audit quality, may be threatened when firms engage in lowballing. Lowballing occurs when an auditor reduces the quote for an initial fee in the hope of attracting a new client, despite the set-up costs involved in an initial audit (for example, learning about the company's business, internal controls and accounting system). It is commonly believed to harm auditor independence as the new auditor needs to retain the audit for several years to recover these set-up costs. For example, the state of Texas outlawed lowballing in 1991. The relevant Act specifies that an accountant 'who performs or offers to perform a service involving auditing skills for compensation that is less than the direct labour cost reasonably

expected to be incurred in performing the service creates a presumption of loss of independence'.

There is much anecdotal but little substantive evidence that lowballing occurs. Pong and Whittington (1994) find evidence in the UK that new auditors charge less, on average, than continuing incumbent auditors. However, this could be due to lower costs rather than low-balling per se. We cannot directly observe the split between the cost and rent elements in audit fees.

DeAngelo (1981b) argues that lowballing does not impair independence, as it is simply a result of competition for future 'quasi-rents'. She points out that it is the existence of the client-specific quasi rents which (potentially) impairs independence, and not the lowballing itself, as rational auditors recognise that initial costs are sunk from the perspective of future periods.

DeAngelo defines a given period's client-specific quasi-rents as the excess of revenues over avoidable (relevant) costs, where avoidable costs include the opportunity cost of auditing the next-best alternative client. If no quasi-rents are expected, the auditor is indifferent to losing the client and will report perfectly independently, where the level of auditor independence is defined as the conditional probability that, given a breach has been discovered, the auditor reports the breach. If quasi-rents are expected, then the auditor has an economic interest in retaining the client. The greater the auditor's economic interest (quasi-rents), the lower the perceived probability that the auditor will report a discovered breach.

When contracting is costly, incumbent auditors do expect to earn quasi-rents, because the transaction costs of changing auditors mean incumbents can set fees

higher than their avoidable costs.[9] In other words, future quasi-rents arise because client firms face switching costs should they change auditor. Competition among auditors for the initial engagement, i.e. for the rights to those quasi-rents, results in lowballing. The maximum amount of the initial discount is equal to the discounted value of the future expected quasi-rents. Lowballing does not cause future quasi-rents, but vice versa. DeAngelo concludes that agreements to prevent lowballing do not ensure independence, as they are irrelevant in future periods, and do not prevent auditors from earning quasi-rents in those periods.

3. AUDIT QUALITY

The issue of independence is important in audit quality. For example, DeAngelo (1981a) defines audit quality as the joint probability that a given auditor will both (a) discover a breach (misstatement or fundamental uncertainty) and (b) report the breach. Auditor ability and effort determine whether an auditor will discover a misstatement, whereas auditor independence influences whether a breach will be reported. In this section I discuss the possible meaning of 'audit quality' in relation to the auditor's work and attributes, and identify definitions of audit quality in the literature. In particular, the notions of auditor accuracy and auditor conservatism are explored. In addition to the large audit firm fee premium, further evidence to support the existence of a quality differential between large and small audit firms is briefly reviewed, and attempts to identify the information content of audit reports (and hence measure audit quality in one sense) are discussed. Finally, I describe how the approach presented in Chapters 3, 4 and 5 relates to definitions of and approaches to audit quality in the literature. I do not extend the literature on the information content of audit reports, instead I focus on the quality of the accompanying financial

[9] Changing auditors may also send an unfavourable signal to investors, if they believe that the change is motivated by a desire to avoid an audit report modification.

information, as evidenced by audit reports (Chapter 3) or earnings management (Chapters 4 and 5).

Recall that, in Section 1, I described how audit quality is generally unobservable, and is multi-dimensional. This section expands on the notion that audit quality is multi-dimensional. In addition to the DeAngelo definition of audit quality presented above, I identify a number of different approaches in the literature, consistent with the multi-dimensionality of the concept. Some of these approaches are apparent in the literature which relates to the existence of an audit quality differential. This literature is reviewed first.

3.1 Evidence of an Audit Quality Differential

Section 2.6 reviewed empirical studies of the determinants of audit fees which show that large audit firms tend to receive higher fees than small audit firms. These studies can only *suggest* that large auditors are associated with higher quality. The results may also be consistent with greater market power, and indeed the studies do not seek to define audit quality. Nevertheless, there is a general consensus that a quality differential does exist. For example, Lee (1996) find no evidence to support a market power argument. Lee discriminates between market power and product (quality) differentiation effects on fees in Hong Kong, where a non-Big 6 auditor has comparable market share to the third and fourth largest Big 6 firms and there is wide variation in market shares of Big 6 firms. Lee finds that Big 6 auditors still earn a fee premium over the large local firm, which is consistent with product differentiation rather than monopoly pricing. The results in Chapter 2 also help support the existence of a quality differential.

In addition to studies of audit fees, there are several empirical and theoretical papers which support the idea that large audit firms provide higher quality audits. For

example, Dye (1993) shows theoretically that large audit firms will provide higher quality because they have more wealth at risk from litigation. Similarly, DeAngelo (1981a) proposes that consumers of audits may rely on audit firm size as a surrogate for audit quality, as large audit firms have more at risk from reputation losses (because they have more clients and/or larger clients). Empirical papers also provide suggestions for definitions of audit quality.

Empirical studies show that high reputation investment banks underwriting initial public offerings prefer their clients to hire large audit firms, and those that do so are charged a lower banking fee (Menon and Williams, 1991; Balvers et al., 1988). In addition, DeFond et al. (2000) find that hiring large audit firms significantly increases the likelihood of audit qualifications in companies listed on the Shanghai and Shenzhen stock exchanges and argue that this is because they are higher quality. Keasey et al. (1988) also find large audit firms significantly increase the likelihood of (small company) audit qualifications in the UK. Similarly, Francis and Krishnan (1999) compare audit report modifications issued by large and small audit firms, and find that large audit firms are more conservative (in the sense that they are more likely to issue modifications) in their reporting on companies with high values of income-increasing accounting accruals (earnings management). In this thesis I examine both whether large audit firms are more likely to issue modified audit reports than other audit firms (Chapter 3), and whether large audit firms are associated with less (income-increasing) earnings management than other audit firms (Chapters 4 and 5).

3.2 Accuracy and Conservatism

Perhaps the most natural way to think of audit quality is not in terms of conservatism, but in terms of accuracy. Using this as a definition, a high quality audit could be defined as one which minimises the likelihood of both Type I and Type II errors,

where a Type I error is the issue of a clean audit report when the report should have been modified, and a Type II error is the issue of a modified audit report when the report should have been clean. If the frequency of such errors can be measured, this would provide a natural measure of relative audit quality.

There will always be some chance of error as auditors perform audit tests on a sample basis (and consider subjective choices of accounting policy and accounting estimates). It may not be straightforward to determine an acceptably low threshold level of error for a 'quality' audit, but relative levels may be compared (the lower the better), and it must be recognised that there is a trade-off with cost. A more serious concern is the identification of errors when they occur. Academic attempts to measure the accuracy of audit reports are limited to studies of auditors' ability to predict corporate failure (e.g. Lennox, 1999), and the incidence of litigation against the client (Raghunandan, 1993). This is because we may not generally observe a firm's true financial position and performance, in order to determine for ourselves whether the reported financial statements contain material misstatements. The very factors that give rise to a demand for auditing for monitoring purposes, prevent the researcher from assessing this aspect of the auditor's work.

In order to measure audit accuracy, both Type I and Type II errors must be considered. Balachandran and Nagarajan (1987) and Nelson et al. (1988), for example, consider both types of error. However, different types of error may carry different costs. For users and auditors, for example, a Type I error is likely to be more costly than a Type II error, whereas Type II errors are more likely to result in loss to the company or its management (in relation to going-concern modifications this might

include 'self-fulfilling prophecy' effects). Auditors do not appear to face litigation for Type II errors, whereas the scale of litigation related to Type I errors is considerable.[10]

Conservatism is a related definition of quality which takes account of the fact that Type I and Type II errors are likely to have different costs. In particular, Type I errors are likely to be more costly to society as a whole (and to users of audit reports and the auditors themselves in particular). We may therefore define a quality audit as, alternately, one which has a very low Type I error rate, regardless of the Type II error rate (with which there may well be a trade-off). Thus, the more conservative an auditor is, the more likely he or she is to issue a modified audit report on a given company, and the lower the Type I error rate will be. This definition differs from accuracy as only one error type is considered.

Palmrose (1988) uses a conservative definition of audit quality by only considering Type I errors. Similarly, Francis and Krishnan (1999) define a more conservative auditor as one which is more likely to issue audit report modifications. Basu's (1997) interpretation of conservatism is more subtle in that it captures accountants' tendency to require a higher degree of verification for recognising good news than bad news (prudence), so that earnings reflect bad news more quickly than good news. Basu's interpretation is related to the definition of auditor conservatism applied in Chapter 4 of the thesis. These definitions are not, however, inconsistent with a tendency to issue audit modifications more easily than clean reports.

3.3 Audit Effort, Assurance and Reporting

Whether a quality audit is one which is accurate or conservative, there is a natural relationship between audit quality and audit effort (i.e. the nature, extent, and timing

[10] For example, at the time of writing, Ernst and Young face a $65m civil law suit from three US banks in relation to the 1995 and 1996 audits of Kent International Associates. Arthur Andersen has also effectively been destroyed as a result of the Enron scandal.

of the audit work performed).[11] This provides us with alternative means of defining audit quality, i.e. in terms of inputs to the audit process. However, as discussed earlier, any consideration of audit quality must not stop merely with the performance of the audit work, but must also consider the auditor's subsequent reporting decisions. This gives rise to DeAngelo's (1981a) definition.

DeAngelo (1981a) and Palmrose (1988) define audit quality in terms of the level of assurance provided, i.e. the probability that financial statements contain no material omissions or misstatements. Higher assurance levels correspond to higher audit quality. Palmrose refers specifically to instances in which the auditors provide a clean audit report on financial statements. This is reasonable as, in practice, auditors only face litigation when they fail to modify their audit reports, and Palmrose was specifically studying comparative litigation activities among different sizes and firms of auditors.[12] Unwarranted audit modifications are ignored for the purposes of her definition of quality, which is therefore one of auditor conservatism. In most cases auditors are effectively prevented from modifying audit reports without cause, as the reason for the modification must be disclosed - an exception may be audit reports relating to going concern issues which are open to subjective interpretation.

In contrast, Dye (1993) equates audit quality with adherence to auditing standards, and presents a model in which the prospect of facing litigation arising from

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[11] The extent of audit work concerns sample size or staff time expended. The nature of the audit work performed concerns the choice of audit tests and the type (e.g. reliability) of the audit evidence gathered. For example, original documentary evidence obtained directly by the auditor is deemed to be more reliable (Statement of Auditing Standard - SAS - 400) than photocopied documents obtained by the client management. The timing of the audit work concerns when, in relation to the end of the accounting period, the audit work is conducted.

[12] Note that although Lys and Watts (1994) provide evidence that auditors who do issue modified audit reports are sometimes sued, such suits arise when modifications in one year identify a problem that the auditor failed to discover in previous years when the audit report was not modified. Additionally, it is possible that the client company could sue an auditor for issuing an *unwarranted* audit modification, but I have been unable to identify any actual instances. It has been shown that companies switch auditor more frequently after receiving modified audit reports (Chow and Rice, 1982; Craswell, 1988; and Citron and Taffler, 1992) and I would suggest that this is a far cheaper (and more certain) method for companies to punish their auditors, albeit less rewarding as there is no litigation settlement.

substandard audits provides motivation for auditors to adhere to auditing standards. Dye argues that large audit firms with more wealth at risk from litigation, the proverbial 'deep pockets', have more incentive to provide quality.[13] He does not specifically address auditor reporting choices.

Moore and Scott (1988) do consider auditor reporting choices in an extension to their model of audit effort, whereby auditors may collude with management in reporting book rather than audit asset values. Melumad and Thoman (1990) also consider both audit effort and reporting choices in their model.

Hatherly, Nadeau and Thomas (1996) argue that it is also important to consider the influence of the audit on the behaviour of management. They identify two constructs of audit quality; one is concerned with high auditor effort and consistency between the audit report and the audit findings, the other is concerned with high auditee effort invoked by auditor behaviour (which may not necessarily involve high effort on the part of the auditor).

Similarly, Pae and Yoo (2001) present a model in which a firm's owner, an auditor, and outside investors strategically interact. The owner's investment in the firm's internal control system and the auditor's effort jointly affect the informativeness of the auditor's report on the financial statements. Pae and Yoo show that, depending on the size of the auditor's legal liability to investors, either the owner under-invests and the auditor over-invests, or vice versa. According to their model, no damage award to outside investors can induce both the owner and auditor to make socially optimal investments.

[13] 'Deep pockets' arise in part because of the professional indemnity insurance held by auditors. A reduction in the availability of this insurance coverage has recently given the profession cause for concern.

3.4 Professional Judgement

As noted in Section 1.1, audit effort and reporting decisions necessarily involve the application of professional judgement on the part of the auditor. Auditing standards are not prescriptive. Furthermore, the auditor must judge the appropriateness of the accounting policies applied by the company directors, and also the reasonableness of estimates where these have been included in the accounts. These are by their nature subjective so it is important that the auditor is sufficiently skilled, knowledgeable and experienced to reach reasonable conclusions (note that there may be more than one acceptable opinion). Hence the quality of the auditor's professional judgement must feature as part of any assessment of overall audit quality.

It has also been suggested that the application of professional judgement to auditor reporting decisions may enable auditors to signal their private information about the company to users of the audit report (Grout et al., 1994). Grout et al. view auditors as being able to signal their private, subjective information about the client company, by choosing to issue modified or clean audit reports when the information reported in the financial statements, or the manner in which it is disclosed, is such that the audit report appears unjustified.

Signalling favourable private information in this way requires that the user of the accounts can indeed identify the problems 'revealed' by the financial statements. The current regulatory framework for financial accounting with its detailed disclosure requirements are such that it is difficult to perceive of many modern situations where this could occur. The authors use as illustration the 1931 case of *R v Kylsant and Morland*, 'The Royal Mail' case. In this case, sizeable transfers to and from reserves, which in some cases turned losses into profits, were not disclosed by amount in the accounts, but only as a note indicating that the reported results 'included transfers

from reserves'. The only possible justification for similar reporting practices under the modern system would have to be that the adoption of accounting treatments, outlawed by accounting standards, was necessary under the 'true and fair view' departure clause.[14] 'True and fair view' is a somewhat vague term which is not clearly defined in statute. However a legal opinion on the meaning of the term was reported in *Accountancy* (November, 1993). Counsel stated that '... the courts will treat compliance with accepted accounting principles as *prima facie* evidence that the accounts are true and fair'. This definition would make a true and fair view override of accounting standards highly unlikely to be accepted.

However, an area where this type of signalling may feasibly occur is in the reporting of discretionary accruals. Accruals feature in all UK financial statements, and are by their very nature subjective and open to manipulation. The level of discretionary accruals in a given set of accounts may be estimated from financial statement data using a number of different empirical models (e.g. Jones, 1991). Users doing so are therefore able to identify what appear to be abnormally high levels of discretionary accruals in company accounts, and to interpret the accompanying audit report accordingly.

Chapter 4, 'Are Large Auditors More Conservative? Earnings Management and Auditor Choice in the UK' considers audit quality in terms of the level of earnings management (measured by discretionary accruals) in reported financial statements. Clients of large and small audit firms are compared. Audit quality here is equated with conservatism in the sense that a high quality auditor is regarded as one who is associated with low levels of earnings management. This is an indirect examination of audit quality, which takes account of the influence of the audit on the

[14] Although compliance with accounting standards will normally be necessary for financial statements to give a true and fair view (Foreword to Accounting Standards, ASB, 1993), the true and fair view requirement as laid out in Sections 226 and 227 of the Companies Act 1985 (as amended) is overriding.

behaviour of management, as suggested by Hatherly, Nadeau and Thomas (1996). I show both that large auditors are associated with lower levels of reported signed discretionary accruals, and that clients of large audit firms report higher levels of signed discretionary accruals (i.e. more positive discretionary accruals) with large audit firms than other companies would.

From the viewpoint of users who would benefit from observing auditors' private information through their choice of audit report, a 'quality' audit would be one that signalled private information successfully. It is not clear that such a definition coincides with either conservatism or accuracy, although successful private information signalling is not inconsistent with audit accuracy as long as the auditor's subjective private information is correlated with the 'true' report type. Excessive conservatism, on the other hand, would likely prevent the transmission of *any* favourable private information; companies which appeared 'bad' on paper would always receive modified audit reports.

Recall that there is a menu of different audit reports available to UK auditors. A modified audit report may contain a qualified audit opinion (on the grounds of disagreement or lack of audit evidence) and/or an explanatory paragraph highlighting a fundamental uncertainty (including fundamental uncertainties relating to going concern). A clean audit report contains neither. Of course, any qualified audit opinion is essentially a signal of the private information gathered by the auditor in the course of the audit work (that the financial statements are or might be materially misstated). Modified reports detailing fundamental uncertainties, including those relating to going concern, are stressing issues that are deemed to have been already adequately disclosed in the accounts.

The choice of one audit report over another (for example, choosing a relatively mild 'except for' disagreement qualified audit opinion rather than expressing a severe 'adverse opinion') may be one method by which auditors can attempt to signal private information, although any type of qualified audit report is rare. This method of signalling information would only work if it is possible to form an expectation of the audit report, by transparent financial (mis)reporting, as discussed above. In order to form such an expectation, a model of audit reporting may be developed.

Chapter 3 'Does One Size Fit All? Evidence from a Multinomial Logit Model for Predicting Audit Reports' identifies some of the determinants of modified audit reports in the UK using a multinomial logit model to distinguish between clean reports, going-concern related audit modifications, and other modifications (including qualifications on the grounds of disagreement or limitation of scope). Included in the explanatory variables are two dummy variables indicating the corresponding audit report type for the prior year – the lagged audit report. These variables are found to be highly significant in determining the current audit report type. This chapter provides strong evidence of persistence in both going-concern and non-going-concern related audit report modifications. It also provides evidence for the ability of these models to successfully predict audit report type.

Earlier empirical studies have also shown that there is strong persistence in audit reporting (e.g. Keasey et al., 1988; Monroe and Teh, 1993; Krishnan et al., 1996; Citron and Taffler, 2000). There are various explanations for reporting persistence - auditors may be unwilling to give newly modified reports because of the fear of client loss. In addition, newly modified reports may trigger litigation if they signal that auditors failed to discover problems in previous years. However, once a report has been modified in one year and the client has not switched auditors, the

auditor then has incentives to continue to modify in subsequent years; the 'switch threat' has been removed but a modification could still avoid litigation. These factors suggest that newly modified reports may be associated with more serious problems than repeated modified reports.

In addition, Chapter 3 assesses the ability of the multinomial logit model to successfully predict audit report types, and compares it to a naïve model which predicts the audit report type to be equal to the prior year report type. Although the lagged audit report variables are not the only significant determinants of current audit report type, use of the multinomial logit model does not significantly reduce prediction error costs relative to the naïve model. The relative importance of lagged audit reports suggests that the signalling value of repeated audit report modifications may be low. Therefore, the information content of modified audit reports may be greater when previous reports are clean rather than modified.

3.5 Credibility and Independence

A quality audit implicitly requires that the audit report be credible. Concerns over lack of auditor independence from their clients threaten the credibility of audit reports. For example, in the wake of the collapse of Enron, Sir Bryan Carsberg, the former secretary-general of the International Accounting Standards Committee, commented that 'the fundamental problem ... the essential conflict of interest is in the audit process itself. So long as the auditors of a company are, in practice, chosen by the executives of that company ... it is very difficult for auditors to maintain objectivity' (*The Financial Times*, April 2nd 2002).

Carsberg's concern over independence stems from the fact that auditor tenure is usually in the gift of management. Auditors report to shareholders but in practice it is management who control auditor hiring and remuneration. Hence auditors may not

report management failings truthfully to shareholders, fearing they may lose business as a result. Acemoglu and Gietzmann (1997) show that auditors' potential legal liability may make it credible to expect that auditors will not collude with management. To further safeguard auditor independence and integrity in the UK, the Companies Act contains minimum requirements that statutory auditors may not be officers or employees of the company audited. These factors are augmented by ethical and professional standards, but their efficacy is frequently criticised in the press. Sometimes this is clearly justified, for example when breaches of guidelines are discovered. However, it is usually hard to judge objectively how successful such standards are. Arriving at an accurate and objective measure of the degree of independence of any auditor is particularly difficult as it is likely to vary from one client to the next.

Auditor independence is very much an international concern. In the UK, *AccountingWeb* reported on 18th January 2002 that labour MP Austin Mitchell had tabled a motion calling for auditors to be banned from undertaking non-audit work for their audit clients. The International Federation of Accountants (IFAC) recently published a new code of ethics. In the US, public concern first grew following the SEC's discovery of 8,000 violations of client shareholding rules at PriceWaterhouseCoopers during an investigation on the newly-merged firm in 2000.

Following the discovery of this widespread non-compliance by PriceWaterhouseCoopers, the SEC issued proposals for new independence rules in November 2000. For the first time in the US, audit fees and fees for IT and consultancy work must now be disclosed in company financial statements. The new rules further govern investments by auditors or their family members in audit clients, employment relationships between auditors or their family members and their client,

and the scope of services provided by audit firms to their audit clients. Non-audit services initially banned were bookkeeping, systems design and implementation except for IT consultancy (subject to certain criteria), appraisal or valuation services if material to the financial statements, certain types of actuarial services, some types and amounts (in hours) of internal audit work, management functions, human resources except for advice regarding and interview of prospective job candidates, broker-dealer services, and legal services. However, the rules regarding investments in shares were in fact *relaxed* by narrowing the definition of those affected to include only those who work on or who can influence the audit of the company concerned, rather than to include all employees of the audit firm.

The rules banning provision of bookkeeping services were also relaxed following the events of September 11th 2001. However, subsequent to the collapse of Enron in December 2001, Congress introduced the Sarbanes-Oxley Act in July 2002. This Act creates a Public Company Accounting Oversight board and severely curtails the consulting services audit firms can perform for their clients in line with the original SEC proposals, reinstating the ban on bookkeeping. The Act covers audit reports by foreign accounting firms as well as US firms.

Auditor independence can be threatened by over reliance on revenues from the client, over familiarity with the client, mutual or conflicting interests, or if the auditor is effectively auditing their own work. Over reliance on client revenues is an issue because of the *de facto* control of auditor choice and remuneration by management rather than by the body of shareholders to which they report, and the provision of lucrative additional services (such as taxation advice or management consultancy) to audit clients. Client switch threats (the threat that the auditee company may switch to an alternative audit firm) may influence auditors' reporting decisions when the threat

is credible and the potential loss of income is sufficiently high. Chow and Rice (1982) provide evidence that companies do switch auditors more frequently after audit modification, and Lennox (1999) shows that auditor switching can influence audit reporting, although the effect of switch *threats* is not directly examined.

Over reliance can arise either because the client is particularly large relative to other audit clients, or if fees for audit or non-audit services are unusually high relative to costs. The former should be prevented by ethical guidelines concerning the acceptability of new clients. The latter is harder to enforce as information on audit costs is confidential to the auditor. It may impair independence because auditors may be reluctant to lose such profitable clients by issuing unfavourable audit reports (they are earning quasi-rents). Income from non-audit services is also suggested to impair independence, particularly as it is often higher than the audit fees for the same client. In October 2000, *Accountancy* reported that only 30% of the £900m fees earned annually by audit firms from FTSE 350 clients came from the statutory audit. Non-audit services may conversely improve audit quality by increasing the auditor's knowledge of the client (and may also, in this case, result in naturally lower audit fees) (Canning and Gwilliam, 2002). The results of the audit report model estimations reported in Chapter 2 show that non-audit fees are not significant in determining audit report types in the UK, suggesting either that they do not affect audit quality, or that the two effects cancel each other out.

Low fees may also be a threat to auditor independence if lowballing is thought to have occurred. Recall that lowballing is the practice whereby auditors win new clients by underbidding their competitors by so much that they are likely to incur a loss on the cost of the audit. However, Lee and Gu (1998) argue that as lowballing reduces the transaction costs associated with the audit engagement, it can actually

improve auditor independence as it makes it easier for the shareholders to switch auditors if the auditor is found to have colluded with management.

Over-familiarity with the client arises through repeated contact between individuals such as the audit partner and/or manager and key client staff. Such contact may extend to social events. Mandatory auditor rotation would alleviate the risk that personal friendships may pose to auditor independence, but at the price of incurring set-up costs with each new auditor. Mandatory rotation may also alleviate auditors' reappointment concerns. In this respect, Gietzmann and Sen (2002) analyse the trade-off theoretically, and show that the improved incentives for independence outweigh the associated costs in 'thin' audit markets with relatively few large clients.

3.6 The Information Content of Audit Reports

Studies have tested whether audit reports signal valuable information to investors by examining the impact of modified reports on stock market values (via event studies), the probability of bankruptcy or litigation, and lending decisions. These studies are discussed below.

The ability of audit reports to signal incremental information is generally reduced if the audit report is predictable from publicly observable characteristics such as those included in the multinomial logit model of audit reporting in Chapter 2. They can only carry information to the extent that they are unexpected. Hence studies of the information content of audit reports should focus on unexpected audit reports. As it highlights the importance of persistence in audit reporting, Chapter 2 provides evidence that first-time audit modifications can be used as a proxy for unexpected audit reports. This approach has been used by event studies (e.g. Dodd et al., 1984; Dopuch et al., 1986).

Event studies have tested the information content of audit reports by examining how the stock market reacts to news of modified audit reports. Abnormal returns are indications that an event carries information content. Some studies have found that share prices fall following qualified reports which suggests that audit reports do signal useful information to investors (Firth, 1978; Banks and Kinney, 1982; Dopuch et al., 1986; Fleak and Wilson, 1994). In contrast, other studies have found no relationship between the content of the audit report and share prices (Elliott, 1982; Dodd et al., 1984). Thus, the evidence from event studies is inconclusive. Dopuch et al. (1986) attempted to explain the differences in their results and those of the earlier paper by Dodd et al. (1984), but without complete success.

Event studies suffer from difficulties in identifying precise event dates, and the presence of concurrent events or the simultaneous release of confounding information (particularly problematic when audit opinions are announced concurrently with other accounting information such as earnings), and problems of methodology. For example, there is choice over the length and timing of estimation and event periods, and of the model used to estimate expected returns for the abnormal return calculations. Event studies also rest on an assumption of semi-strong market efficiency.

More recently, research by Choi and Jeter (1992) has concluded only that 'audit qualifications reduce the market's responsiveness to earnings announcements by altering the market's perception of earnings noise or the persistence of earnings, or both'. This last conclusion is consistent with the comment made by Craswell (1985) in his review of the literature that 'audit reports are, in general, not important for themselves but for their influence on investors' assessments of the financial statements. It may be unrealistic, therefore, to expect to disassociate audit reports

from the companies' financial statements and to aim to identify the information content of qualified audit reports *per se*'.

Event studies can generally only identify short-term effects. A recent literature has evolved which examines long-run abnormal returns in response to events. However, a problem with using this approach to examine the effects of modified audit reports is that many companies receiving such reports in the UK delist or go bankrupt less than a year from the announcement date, so that there is very little data to analyse. The long time periods concerned also increase the likelihood of confounding events occurring within the time frame.

A second way to determine whether audit reports signal useful information, is to examine whether they affect managerial pay or appointments, although there is no empirical evidence on this to date. Any studies would also encounter many of the same difficulties faced by event studies, for example regarding confounding information releases. If modified reports signal to investors that there are stewardship problems, one might expect modified reports to reduce managerial pay and/or increase the probability than managers are replaced. Since modified audit reports are generally given to companies that are financially distressed and/or employ questionable accounting policies, we might expect modified reports to signal to investors that managers have performed poorly - investors might respond to such information by reducing managerial pay and/or removing the manager.

It is reasonable to assume that auditor-client disagreements over accounting policy are within the control of management. On the other hand, companies may experience going-concern problems due to factors outside of management control. The pay-performance literature has argued that when managers are risk-averse and poor performance is mainly due to exogenous factors, one should find only a weak

correlation between performance and compensation/turnover. Thus, the strength of any association between audit reports and compensation/turnover is likely to depend on whether reports were modified for going-concern or other accounting issues, if managers are not responsible for poor performance. However, it is difficult to determine whether managers are responsible for performance.

A third way to evaluate the information content of audit reports is to test whether they help to identify failing companies (Koh, 1991; Hopwood et al., 1989; Lennox, 1999) or the incidence of litigation against companies (Raghunandan, 1993).

Existing evidence indicates that audit reports are not accurate indicators of financial distress. Although Hopwood et al. (1989) find audit reports significant in explaining bankruptcy, Lennox (1999) points out that publicly observable variables which help to identify failing companies, such as company size, industry sector, and the economic cycle, are omitted in their study. By controlling for these variables, and non-linearities, Lennox finds that the significance of the audit report dummy variable disappears. Koh (1991) also finds evidence that, compared to statistical models used to predict bankruptcy, audit opinions carry little or no incremental information for identifying failing companies.

Furthermore, few failing companies even receive going-concern related audit report modifications. Lennox (1999) finds that auditors disclose going-concern uncertainties in only 17% of failing listed UK companies, consistent with the results of Citron and Taffler (1992). For private companies in the UK, Lennox notes that only 5% of failing companies receive going-concern modifications (Barnes and Hooi, 1987). In Koh's (1991) sample of 141 failing and 189 non-failing US companies, approximately 46% of the failing companies did not receive audit report

modifications, comparing unfavourably to the 85% successful classification rate of his benchmark bankruptcy model.

Going-concern related audit modifications may also be given to ultimately healthy companies - in a sample of 40 listed companies that received modified reports, Taffler and Tseung (1984) find that only 10 failed. Lennox similarly finds that out of 124 companies receiving going-concern modifications, only 21 fail in the subsequent year.

Bankruptcy studies suffer because they can only evaluate one type of audit report modification, and because the frequency of going-concern related audit modifications may be reduced because of the 'self-fulfilling prophecy hypothesis'. It is sometimes argued that auditors fail to modify audit reports for going concern uncertainties when they feel that the modification will in itself result in financial difficulties or bankruptcy for the company concerned, whereas without a modification the company would continue without such difficulties. This is known as the self-fulfilling prophecy hypothesis and rests on the assumption of incremental information contained in audit reports.

However, although it is theoretically possible that the issue of a modification on going concern grounds could contribute to the failure of an otherwise viable company (Matsumura et al., 1997), empirical testing of the going-concern hypothesis is hampered by issues of causal direction – it is important to be able to isolate the impact on going-concern of issues leading to a going-concern audit modification from the impact of the modification itself, but these issues may not always be observable. Controlling for observable characteristics that influence bankruptcy, Lennox (1999) shows no significant incremental effect of going-concern related audit modifications on bankruptcy, which suggests that the hypothesis is false. Other empirical evidence

to date in the UK also suggests that it does not occur in practice (Citron and Taffler, 2000).

Citron and Taffler use a matched sample approach to control for company characteristics. One of the matching criteria they use is z-score, generated by a statistical bankruptcy model.[15] Unfortunately, their study is potentially flawed, as non-bankrupt firms with going-concern modifications are only included in the study if they have negative (or almost negative) z-scores at some point in the period under examination. As, by construction of the z-score model, companies with low z-scores are more likely to become bankrupt, and as the non-modified companies are only included in the sample if they are matched with modified companies on the basis of, among other things, z-score, one might expect that the sample would be biased towards underestimation of the effect of modification on bankruptcy. However, it is unlikely that a company with a high z-score would receive a going-concern modification.

An alternative method of examining the information content of audit reports is to conduct experimental studies looking at the effect of audit reports on decisions by, for example, bankers as to whether or not to lend money to companies (Firth, 1980).

The main difference between the other studies of the information content of modified audit reports and these experimental studies, is that decisions are simulated. This enables some of the problems, for example of simultaneous information releases, to be overcome. However, only limited conclusions may be drawn from experimental studies due to problems of internal and external validity. Craswell (1985) includes a

[15] The other matching criteria used are listing status - full listing or listed on the Unlisted Securities Market (now AIM), industry sector, and size. Z-scores are linear combinations of various financial ratios and a constant term derived from bankruptcy models estimated in prior studies, similar to that employed by Altman (1968), that indicate degree of financial distress.

summary of experimental studies and their shortcomings, concluding that any conclusions drawn from experimental studies should be treated with caution.

In each of the studies discussed by Craswell, cases were prepared and presented to subjects who were required to undertake an experimental task, including estimation of the maximum loan that could be made (Estes and Reimer, 1977; Firth, 1979; and Firth, 1980), estimation of share prices (Estes and Reimer, 1979) and estimation of interest rate premiums (Libby, 1979). Results suggest that modifications do not provide information for lending officers apart from the reasons given by the auditors, but that lending officers and credit analysts appear to be able to distinguish reasons relating to going concern and uncertainties from those that record technical breaches of accounting rules. These results are, however, subject to severe problems of validity due to the abstract nature of the experimental tasks performed, subject selection, and problems of bias in the studies by Libby and Firth.

3.7 Other Dimensions of Quality

Any discussion of audit quality would not be complete without mentioning other important dimensions of the audit process that may impact on quality. For example, the timeliness of the audit report is likely to be important for users' decision-making purposes, but there may be a trade-off between speed and accuracy. Similarly, the length of the audit visit may be important to management wishing to keep disruption to normal procedures to a minimum, but again there may be a trade-off between speed and accuracy. If an audit is demanded primarily to provide services to management (see Section 2.4), for example by a small owner-managed company, then its ability to fulfil those services should take precedence over other quality considerations.

Interestingly, provision of a 'high quality' audit in terms of fielding better qualified audit staff and/or fielding more audit staff may incidentally both reduce the

length of the audit visit, improve advice or other services provided to management, *and* increase the likelihood of detecting misstatements in the financial statements. I would however suggest that these considerations should not form a primary definition of audit quality, and that the quality of an audit should be measured on its outcomes not its inputs.

3.8 The Interpretation of Audit Quality in the Thesis

In this thesis I do not consider audit quality in terms of services to management (Section 3.7), or the incremental information content of audit reports (Section 3.6). After confirming that there is evidence that a quality differential exists between large audit firms and other audit firms (Chapter 2), I examine the quality differential with respect to the quality of financial information in corporate reports. In this respect I draw upon DeAngelo's (1981a) definition of audit quality. As discussed earlier in Section 3, DeAngelo considers audit quality in relation to the level of assurance provided by the audit, i.e. the probability that financial statements contain no material omissions or misstatements (or fundamental uncertainties). She equates this to the joint probability that a given auditor will both (a) discover a breach and (b) report the breach. However, I cannot measure audit quality directly in terms of the inputs to the audit process (auditor ability, effort and independence) which determine this joint probability. Therefore I use proxies to measure the output to the audit process, namely the level of assurance provided and the quality of the financial statements (whether they contain material omissions or misstatements). I examine the audit reports issued (Chapter 3) as a measure of the level of assurance, and the level of earnings management in the financial statements (Chapters 4 and 5) as a measure of the quality of the financial statements.

In Chapter 3 I test whether large audit firms are more likely to issue modified audit reports than other audit firms. If large audit firms provide more assurance, they should be both more likely to discover and to report a breach. This is done via the audit report. All else being equal, if large audit firms are higher quality then they should be more likely to issue modified audit reports. As I have no benchmark against which to judge the accuracy of the audit reports, I equate audit quality in this chapter with conservatism in audit reporting (Section 3.2). Although I cannot directly measure auditor independence, I do include audit and non-audit fees as explanatory variables to test whether fee levels affect independence and hence audit reporting. In so far as these variables control for independence, the effect of audit firm size on audit reporting should capture auditor effort and ability. This chapter most closely reflects DeAngelo's definition of audit quality.

In Chapter 4 I test whether the clients of large audit firms engage in less (income-increasing) earnings management than other audit firms' clients, using estimated discretionary accruals as a measure of earnings management. Audit quality is therefore equated to conservatism in corporate reports, and I separate the auditor effect from the effect of client characteristics on financial statement content. Similarly, in Chapter 5, I test whether the clients of large audit firms engage in less earnings management, using earnings discontinuities as a measure of earnings management. In these chapters I define the level of assurance provided by the audit not in terms of the inputs to the audit processes of discovering and reporting breaches, or in terms of the audit report, but in terms of the effect that the audit has on the content of the financial statements themselves. Either the auditor requires the financial statements to be adjusted to correct discovered breaches, or the manager

preparing the financial statements puts in additional effort to avoid breaches in anticipation of the auditor's findings.

4. THE GOVERNANCE CONTEXT OF THE UK

In the discussion of audit quality in this chapter and in the thesis as a whole, it is important to note that the contribution of auditing to financial reporting quality is perhaps not independent of the general corporate governance context of the reporting firm. For example, corporate governance provisions which relate to the operation of audit committees potentially improve auditor independence, and provisions which relate to managerial structure and tenure may influence the degree of earnings management which affects the financial statements. Corporate governance relates to the structures, both within a company and imposed by society, which control how companies are governed.

In this thesis, I am limited in my ability to control for corporate governance measures by data availability. Chapter 3 does not control for corporate governance measures which may differ across the sample of firms, although stock exchange listing is controlled for and may proxy for improved governance in general (recommended governance provisions under the Combined Code in the UK generally apply only to listed companies). Chapters 4 and 5 only analyse listed companies, and include the proportion of non-executive directors on the Board as an explanatory variable relating to audit firm choice, but do not directly control for other differences in corporate governance across firms which may affect corporate reporting. This section summarises corporate governance provisions in the UK which are most likely to influence auditing and financial reporting quality.

4.1 The Combined Code

The Cadbury Committee Report (1992) set out a voluntary Code of Best Practice, which was later modified by the Greenbury Report (1995) and the Hampel Report (1998) to become the Combined Code. Compliance with Section 1 of both parts of the Combined Code, which are applicable to listed companies, is enforceable by the London Stock Exchange. Listed companies must present their statement of compliance with the code. They are required to report both on how they apply the principles set out in the code, and to confirm that they comply with the provisions of the code, or to explain where they have not complied. Part 1 of the Code sets out the Principles of Good Governance, and Part 2 sets out the Codes of Best Practice, which suggest procedures that should be in force of the principles are to be upheld.

The Principles relate to directors and their remuneration, relations with shareholders, accountability and audit, and institutional investors. Important recommendations include:

1. Principles of good governance applicable to directors, including the division of duties at the head of the company (in particular, the separation of the chairman and CEO) so that no one individual has unfettered powers of decision, the inclusion on the board of directors of independent non-executive directors comprising at least one third, and a restriction of three years on the term of service of directors before re-election. In the context of the thesis, high proportions of non-executives may indicate that good governance is high priority and therefore auditor choice and audit reports become more important.
2. Principles of good governance applicable to directors' remuneration, including that a proportion of executive directors' remuneration should be linked to corporate and individual performance, and that remuneration committees

should comprise non-executive directors. Details of directors' remuneration should also be contained in the annual report. In the context of this thesis, note that performance-linked pay may provide incentives for earnings management (agency costs).

3. Principles of good governance applicable to relations with shareholders and to institutional investors, including measures to encourage communication with and participation of shareholders at AGMs. In the context of this thesis, large institutional investors with long-term shareholding commitments may be expected to exercise greater participation in governance decisions. Audit reports may either become more important as a tool for decision-making, or may become less important as ownership becomes closer to control. Managers wishing to avoid 'interference' by institutional shareholders may face greater incentives to manage their financial statements (political costs).
4. Principles of good governance applicable to accountability and audit, concerned with financial reporting, internal control, the audit committee and the external auditors. These principles relate to directors' and auditors' statements of responsibilities, including that the directors' responsibilities extend to reporting that the company is a going concern; that the board should maintain a sound system of internal control, including conducting annual reviews of the effectiveness of internal controls; that the board should establish an audit committee of at least three non-executive directors to review the scope and results of the external audit, its cost effectiveness, the independence and objectivity of the external auditors, and to review the nature and extent of provision of non-audit services by the auditors. In the context of

this thesis, proper operation of an audit committee should improve auditor independence and hence audit quality.

4.2 Other Governance Provisions in the UK – Disclosure of Auditors' Fees

The Companies Act (1985) requires that the fees paid to audit firms for both audit and non-audit work be disclosed in the financial statements. The purpose is to enable readers to form a view on the auditor's financial interest in the company, and hence on the auditor's independence. In the context of this thesis, audit fees have first been used in Chapter 2 as an indicator of audit quality – the presence of a large audit firm fee premium being taken as a return to higher quality. However, in Chapter 3, which analyses audit reports, audit (and non-audit) fees are subsequently used as proxies for auditor independence.

Total audit fees reflect the value of the audit firm's audit services, which in Chapter 2 are assumed to depend on the level of assurance (audit quality) provided (a function both of the cost to the auditor of performing the work, and the auditor's ability and independence). Increased auditor independence, in so far as this increases audit quality, is therefore assumed to increase audit fees. In contrast, Chapter 3 allows that high audit (and non-audit) fees may reduce independence, after controlling for other observable factors affecting audit reporting. In reality, the relationship between fees and auditor independence is unlikely to be straightforward and factors such as the effectiveness of audit committees should also be considered. Perhaps unsurprisingly, Chapter 3 finds no relationship between auditors' fees and audit reporting.

5. CONCLUSION

Audit quality is essentially unobservable. In order to truly measure audit quality, access to underlying accounting records and to confidential audit records for

identified companies is required, in order to gauge the level of audit effort expended, and to match audit findings to audit reports so as to determine whether reporting is truthful. Increased transparency of published audit reports could go some way towards achieving this, for example if audit reports contained more information on the quantity and nature of evidence collected, and details of any misstatements detected that were either adjusted by the client or deemed immaterial.

Audits may be demanded to resolve agency situations of moral hazard and to signal manager's private information to users. Audit reports may also signal auditors' private information. There is evidence that audits are demanded where agency costs are high, but existing research has failed to provide convincing evidence that audit reports contain information for users. Chapter 3 confirms the importance of persistence in audit reporting, which is likely to reduce the ability of modified audit reports to signal information to users. However, there is evidence of a quality differential between large (i.e. Big 5) and small audit firms. Chapter 2 confirms the existence of a large audit firm fee premium when the influence of characteristics driving auditor selection are controlled for. Similarly, Chapters 4 and 5 confirm that large audit firms are associated with lower levels of earnings management in financial statements. Chapter 4 also provides some evidence that auditors may use their professional judgement to signal private information about their clients.

CHAPTER 2

THE LARGE AUDIT FIRM FEE PREMIUM: A CASE OF SELECTIVITY BIAS?

1. INTRODUCTION

There have been several empirical studies of the determinants of audit fees, many of which include among the explanatory variables a dummy for audit firm size (see Moizer (1997) for a review of the audit fee literature). In a competitive audit market, a fee differential between audit firms represents a return to higher quality. It is therefore important to determine the size of the premium charged by large audit firms in order to assess the quality differential between large and small audit firms. This chapter is joint work with my supervisor Clive Lennox, and we find that the approach of previous audit fee studies significantly underestimates the size of the large audit firm fee premium.

As Moizer (1997) notes, audit fee studies reach different conclusions about the existence and size of premia. Fee premia have been found in Australia, New Zealand, UK, Hong Kong, Singapore and India, with estimates ranging from 16.5%-36.0% (Francis, 1984; Craswell et al., 1995; Firth, 1985, 1993; Johnson et al., 1995; Chan et al., 1993; Pong and Whittington, 1994; Simon et al., 1992; Simon et al., 1986). Audit fee studies in other countries find conflicting results. In the US, Simunic (1980) finds no premium whereas Palmrose (1986) and Simon and Francis (1988) find premia of 16-17%. In Canada, Chung and Lindsay (1988) find no premium while Anderson and Zeghal (1994) find premia for small clients only. Other studies find no premia in

Malaysia (Simon et al., 1992), Norway (Firth, 1997), the Netherlands (Langendijk, 1997) and South Africa (Simon, 1995). All the above studies test for a fee premium by including among the explanatory variables a dummy for audit firm size. However, it is invalid to treat an audit firm size dummy as exogenous because companies are not randomly assigned to audit firms. In this case, although it is possible to observe the fees companies pay to their chosen audit firms, it is not possible to observe the fees they would have paid to audit firms of alternative size.

As the focus of this chapter is to determine the size of the quality differential between large (in this case Big 5) and small audit firms, it is vital to control for the effects of auditor selection. This is done using a two-stage model. The first stage models companies' selection of audit firms. The second stage estimates audit fee models in order to determine the effects of selectivity on the estimated fee premium. The estimated fee premium before controlling for selectivity is 19.2%, similar to the 24% estimate of Pong and Whittington (1994). However, the estimated premium is more than twice as large (53.4%) when auditor selection is accounted for. If selectivity effects are ignored the estimated premium is biased downwards because large audit firms' clients pay lower fees than randomly selected clients would pay to large audit firms. This is consistent with high quality companies selecting large audit firms and paying lower fees because they require less audit work (Titman and Trueman, 1986; Thornton and Moore, 1993). It is also consistent with the finding in Chapter 3, that companies choosing large audit firms are less likely to receive non going-concern related audit report modifications than other companies.

Extant theory and empirical research suggest it is appropriate to treat auditor choice as endogenous, as is done in this chapter. Titman and Trueman (1986) and Datar et al. (1991) present signalling models in which high quality companies prefer

more accurate auditors. Empirical studies of auditor choice start from the premise that companies choose whether to hire large or small audit firms (Francis and Wilson, 1988; Johnson and Lys, 1990; DeFond, 1992; Firth and Smith, 1992). The endogenous treatment of auditor choice in these papers contrasts with its exogenous treatment in extant audit fee research.

In addition to estimating the effects of auditor selection bias, this research differs from prior research in two respects. First, some variables are included in the auditor choice model but excluded from the audit fee model in order to provide power for the selectivity tests. The variables used are the proportion of board members who are non-executives and board members' affiliations with audit firms. Although previous auditor choice studies do not include these variables, this chapter shows that they are significantly associated with audit firm size. In particular, a company is more likely to select a large audit firm when the board consists of a high proportion of non-executives and when board members are affiliated with large audit firms. Second, the selectivity adjustment is sensitive to departures from the assumption that audit fee residuals are normally distributed (Maddala, 1983). Log transformations do not result in normally distributed residuals whereas rank transformations do. Therefore rank transformations are used in this chapter whereas most audit fee studies (which do not rely so heavily on the normality assumption), and the research in Chapter 3, use log transformations.

Section 2 details the economic intuition underlying the selectivity bias and describes the auditor selection and audit fee models estimated in the chapter. Section 3 outlines the data and Section 4 evaluates the impact on audit fees of audit firm size and selectivity bias.

2. MODEL SPECIFICATION

2.1 Estimating the large audit firm fee premium

Ignoring auditor selection effects

Previous studies examine the determinants of audit fees (AF) by assuming a model of the following form:

$$AF_i = \beta_0 + \beta'_1 X_i + \beta'_2 Z_i + \beta_3 BIG_i + u_i \qquad (3.1)$$

The X_i variables capture the effects of client characteristics on audit fees, while the Z_i variables capture the effects of auditor characteristics other than size. The effects of audit firm size are captured using a dummy variable (BIG_i), which equals one if company i selects a Big 5 audit firm and equals zero if company i selects a non Big 5 audit firm. Studies often find positive and statistically significant coefficients on audit firm size ($\hat{\beta}_3 > 0$) and conclude there is therefore a large audit firm premium. However, $\hat{\beta}_3$ may be a biased estimate of the premium since BIG_i is endogenous. In particular, clients choose whether to hire large or small audit firms. This chapter shows that $\hat{\beta}_3$ in equation (3.1) significantly understates the true size of the large audit firm fee premium ($\hat{\beta}_3 < \beta_3$).

Equation (3.1) hypothesises that audit firms of different sizes charge different fees. Under laboratory conditions, one would test this hypothesis by comparing the fees that all companies would pay to both large and small audit firms. In practice however, we only observe the fees companies are charged by their selected audit firms. We do not observe the fees companies would pay if they selected audit firms of different size classes.

In order to understand the economic intuition for why auditor selection biases the estimated premium, it is important to understand that client characteristics affect

audit firm choice. Some client characteristics are readily observable and can be directly controlled for. For example, large companies tend to hire large audit firms and also tend to pay high audit fees. If observable factors such as client size are included in the set of X_i variables (equation (3.1)), they will not cause $\hat{\beta}_3$ to be biased. However, although many client characteristics can be directly controlled for, characteristics that are not observable to the academic researcher may affect both fees and auditor choice and thereby cause bias.

In order to see how auditor selection biases the estimated premium, consider equation (3.2) which is an auditor choice probit model.[16]

$$BIG_i^* = \gamma_0 + \gamma'_1 X_i + \gamma'_2 Y_i + v_i \qquad (3.2)$$

where

$BIG_i = 1$ if $BIG_i^* > 0$

$BIG_i = 0$ otherwise

In equations (3.1) and (3.2), the X_i variables affect both audit fees and auditor selection. In contrast, the Z_i and Y_i variables affect only audit fees and auditor selection, respectively. If unobservable factors affect both auditor choice (v_i) and audit fees (u_i) then $E(u_i v_i) \neq 0$. This implies $E(u_i BIG_i) \neq 0$ and so $\hat{\beta}_3 \neq \beta_3$. In other words, the fee premium in equation (3.1) is estimated with bias if BIG_i is endogenous.

The expected direction of the bias can be predicted by making assumptions about how unobserved client characteristics affect auditor choice (v_i) and audit fees (u_i). For example, the quality of internal accounting controls and management integrity are both potentially important characteristics that are unobservable to the researcher. These quality characteristics bias the estimated premium if they

[16] A probit model is used rather than a logit model as the use of rank transformations results in normally distributed error terms, a key assumption of the probit model.

simultaneously affect auditor choice and audit fees. Analytical studies indicate high quality companies are more likely to hire large audit firms and are more likely to pay low audit fees. Titman and Trueman (1986) show high quality companies are more likely to hire large audit firms for signalling reasons. Similarly Thornton and Moore (1993) argue that companies with weak internal controls are more likely to choose low quality auditors. Thornton and Moore (1993) predict that audit fees are negatively associated with internal control strength, which is consistent with auditors doing less substantive testing when internal controls are strong. Statement of Auditing Standard (SAS) 400 states 'where tests of control provide satisfactory evidence as to the effectiveness of accounting and internal control systems, the extent of relevant substantive procedures may be reduced' (Auditing Practices Board, 1995).

According to these arguments, high quality companies are simultaneously more likely to both hire large audit firms, and pay lower audit fees ($E(u_i v_i) < 0$). From equations (3.1) and (3.2), $E(u_i v_i) < 0$ implies $E(u_i BIG_i) < 0$ and so $\hat{\beta}_3 < \beta_3$. In this case, a comparison of fees paid by large and small audit firms' clients biases downwards the estimated fee premium in equation (3.1).

Controlling for auditor selection effects

This chapter employs the two-step procedure of Heckman (1979) to control for selection effects. First, a probit auditor selection model is estimated. The results are then used to generate inverse Mills ratios (these are discussed later in the chapter). Next, the inverse Mills ratios are included in audit fee regressions for large and small audit firms' clients in order to correct for selectivity bias. The results show that the estimated fee premium is significantly biased downwards if the inverse Mills ratios are omitted from the regressions.

To simplify notation, the auditor selection model (equation (3.2)) is written as:

$$BIG_i^* = \gamma_0 + \gamma'_1 X_i + \gamma'_2 Y_i + v_i \equiv \gamma' W_i + v_i \quad (3.3)$$

where $\gamma' \equiv [\gamma_0 : \gamma'_1 : \gamma'_2]$ and $W_i \equiv [1 : X_i : Y_i]$.

The audit fee models for large and small audit firms' clients are:

$$AF_{1i} = \beta_{10} + \beta'_{11} X_i + \beta'_{12} Z_i + u_{1i} \quad (3.4)$$

$$AF_{0i} = \beta_{00} + \beta'_{01} X_i + \beta'_{02} Z_i + u_{0i} \quad (3.5)$$

where AF_{1i} and AF_{0i} are the fees company i would pay to large or small audit firms, respectively. Recall that only one of AF_{1i} and AF_{0i} is observed for each company i, depending on whether the company chooses a large or small audit firm. The selectivity corrections (discussed below) control for the fact that the fees companies would have paid if they had chosen audit firms of alternative size are not observed. From equations (3.4) and (3.5), the estimate of the large audit firm fee premium is $\hat{\beta}_{10} - \hat{\beta}_{00}$. If large audit firms earn higher fees than small audit firms, the intercept term in equation (3.4) will be bigger than the intercept in equation (3.5) (i.e. $\hat{\beta}_{10} > \hat{\beta}_{00}$).

Note that, unlike equation (3.1) and most previous studies, equations (3.4) and (3.5) do not impose the restriction that the coefficients on the X_i and Z_i variables are the same for large and small audit firms (i.e. this approach does not impose the restriction that $\beta'_{11} = \beta'_{01}$ and $\beta'_{12} = \beta'_{02}$).[17] The error terms in equations (3.4), (3.5) and (3.3) (u_{1i}, u_{0i} and v_i) are assumed to have a trivariate normal distribution, with mean vector zero and covariance matrix:

$$\Omega = \begin{bmatrix} \sigma_1^2 & \sigma_{10} & \sigma_{1v} \\ \sigma_{10} & \sigma_0^2 & \sigma_{0v} \\ \sigma_{1v} & \sigma_{0v} & \sigma_v^2 \end{bmatrix}$$

[17] An exception is Pong and Whittington (1994) who control for coefficient differences by including interaction terms between the auditor size dummy and the other explanatory variables. However, Pong and Whittington (1994) do not control for auditor selection effects.

Simple regressions of equations (3.4) and (3.5) can be shown to result in selectivity bias by taking conditional expectations:

$$E[AF_{1i} \mid BIG_i = 1] = \beta_{10} + \beta'_{11}X_i + \beta'_{12}Z_i + E[u_{1i} \mid BIG_i = 1]$$

$$E[AF_{0i} \mid BIG_i = 0] = \beta_{00} + \beta'_{01}X_i + \beta'_{02}Z_i + E[u_{0i} \mid BIG_i = 0]$$

If auditor choice is systematically correlated with audit fees, the conditional means for audit fees and error terms are not equal to their unconditional means:

$$E[AF_{1i} \mid BIG_i = 1] \neq E[AF_{1i}] \Leftrightarrow E[u_{1i} \mid BIG_i = 1] \neq E[u_{1i}]$$

$$E[AF_{0i} \mid BIG_i = 0] \neq E[AF_{0i}] \Leftrightarrow E[u_{0i} \mid BIG_i = 0] \neq E[u_{0i}]$$

In this case, large (small) audit firms' clients pay different fees on average than randomly selected companies would pay to large (small) audit firms. Estimating equations (3.4) and (3.5) results in a biased estimate of the large audit firm fee premium ($\hat{\beta}_{10} - \hat{\beta}_{00}$) if:

$$E[AF_{1i} \mid BIG_i = 1] - E[AF_{0i} \mid BIG_i = 0] \neq E[AF_{1i}] - E[AF_{0i}]$$

or equivalently if:

$$E[u_{1i} \mid BIG_i = 1] - E[u_{0i} \mid BIG_i = 0] \neq 0.$$

The effects of selection bias are controlled for by estimating the following fee models for large and small audit firms:

$$AF_{1i} = \beta_{10} + \beta'_{11}X_i + \beta'_{12}Z_i + \sigma_{1u}\lambda_{1i} + e_{1i} \quad (3.6)$$

$$AF_{0i} = \beta_{00} + \beta'_{01}X_i + \beta'_{02}Z_i + \sigma_{0u}\lambda_{0i} + e_{0i} \quad (3.7)$$

where

$$\sigma_{1u}\lambda_{1i} \equiv \sigma_{1u}\frac{\phi(\gamma W_i)}{\Phi(\gamma W_i)} = E[u_{1i} \mid BIG_i = 1]$$

$$\sigma_{0u}\lambda_{0i} \equiv \sigma_{0u}\frac{\phi(\gamma W_i)}{1-\Phi(\gamma W_i)} = E[u_{0i} \mid BIG_i = 0]$$

$$\sigma_{1u} \equiv \frac{\sigma_1^2 - \sigma_{10}}{\sigma_1},\ \sigma_{0u} \equiv \frac{\sigma_0^2 - \sigma_{10}}{\sigma_1},\ \text{and}\ \sigma_i^2 \equiv Var(u_{1i} - u_{0i}).$$

The functions ϕ and Φ are the standard normal probability density function and the cumulative distribution function, respectively. The key difference between equations (3.4)-(3.5) and equations (3.6)-(3.7) is the latter include inverse Mills ratios (λ_{1i} and λ_{0i}) in order to control for the effects of auditor selection.

In the first stage, inverse Mills ratios (λ_{1i} and λ_{0i}) are constructed using the results from the auditor choice model (equation (3.3)). In the second stage, the audit fee models are estimated by including the inverse Mills ratios in equations (3.6) and (3.7). As a result, the conditional and unconditional expected error terms in equations (3.6) and (3.7) equal zero:

$$E[e_{1i} \mid BIG_i = 1] = E[e_{1i}] = E[e_{0i} \mid BIG_i = 0] = E[e_{0i}] = 0.$$

The estimated large audit firm fee premium ($\hat{\beta}_{10} - \hat{\beta}_{00}$) in equations (3.6) and (3.7) is unbiased since:

$$E[e_{1i} \mid BIG_i = 1] - E[e_{0i} \mid BIG_i = 0] = 0.$$

The economic intuition underlying the signs of the coefficients on the Mills ratios comes from the hypothesis that large audit firms' clients are of higher than average quality and therefore pay lower than average fees (Titman and Trueman, 1986; Thornton and Moore, 1993). If large audit firms' clients pay lower fees than randomly selected companies would pay to large audit firms:

$$E[AF_{1i} \mid BIG_i = 1] < E[AF_{1i}] \Leftrightarrow \sigma_{1u}\lambda_{1i} = E[u_{1i} \mid BIG_i = 1] < E[e_{1i}] = 0$$

Similarly, if small audit firms' clients are of lower than average quality they are expected to pay higher than average fees. If small audit firms' clients pay higher fees than randomly selected companies would pay to small audit firms:

$$E[AF_{0i} \mid BIG_i = 0] < E[AF_{0i}] \Leftrightarrow \sigma_{0u}\lambda_{0i} = E[u_{0i} \mid BIG_i = 0] < E[e_{0i}] = 0$$

Since the inverse Mills ratios (λ_{1i} and λ_{0i}) are both positive by definition, the two conditions above can be re-stated as $\sigma_{1u} < 0$ and $\sigma_{0u} > 0$, respectively. This means the coefficients on the inverse Mills ratios should be negative for large audit firms' clients and positive for small audit firms' clients.

2.2 The Explanatory Variables (X_i, Y_i and Z_i)

Table 1 defines the explanatory variables (X_i, Y_i and Z_i) that are used in the auditor choice and audit fee models. The *i* subscript is dropped from the variable names to simplify notation.

Variables (X_i) included in both the Auditor Choice and Audit Fee Models

From prior research, auditee size, complexity and risk are expected to affect both fees and auditor selection (e.g., Pong and Whittington, 1994). Previous studies use either assets (e.g., Craswell et al., 1995) or sales turnover (e.g., Chan et al., 1993) or both (Pong and Whittington, 1994) to control for client size. This study uses both assets (*ASSE*) and sales (*REV*), as each represents a different dimension of size (Pong and Whittington, 1994). Fees likely reflect both turnover and assets, as audit work involves the examination of both transactions during the year (reported in the profit and loss account and cash flow statement) and year-end balances (reported in the balance sheet). Large companies are expected to hire large audit firms more often than small audit firms, and to pay higher fees.

Table 1
Variable Definitions

Variables (X_i) in both the Auditor Selection and Audit Fee Models.	
ASSE	Assets employed (£000)
REV	Sales turnover (£000)
SIC	Number of SIC codes
DS	Number of domestic (UK) subsidiaries
OS	Number of overseas subsidiaries
LOSS	= 1 if the company made a loss during the past 3 years; = 0 otherwise.
GEAR	$\frac{\text{Preference capital + subordinated debt + loan capital + short-term borrowings}}{\text{Capital employed + short-term borrowing - intangibles}}$
BUSY	= 1 if the year-end is between the 1st December and 31st March; = 0 otherwise.
Variables (Y_i) in the Auditor Selection Models only.	
NEX	$\frac{\text{Number of non-executive directors}}{\text{Number of directors}}$
LAF	= 1 if the influential director is affiliated with a large audit firm; = 0 otherwise.
SAF	= 1 if the influential director is affiliated with a small audit firm; = 0 otherwise.
Variable (Z_i) in the Audit Fee Models only.	
LON	= 1 if the audit office is located in London; = 0 otherwise.

A more complex or more risky auditee requires more audit work. Risk and complexity are in some ways closely linked as a more complex auditee poses higher risk, although risk may also arise from other sources.[18] Again, there are several dimensions of complexity and risk that may be measured. One complexity measure is the number of business areas in which the auditee operates. This is captured by the number of different main SIC (Standard Industry Classification) codes reported for

[18] One example would be the integrity of management.

each client (*SIC*). The existence of subsidiary companies also increases complexity as consolidated accounts must be audited. Hence, the explanatory variables include the number of subsidiary companies located in the UK (*DS*) and overseas (*OS*).

Gearing (*GEAR*) is included as a risk measure, as companies often fail through cash flow problems and binding bond covenants. Profitability is another measure of auditee risk. As in previous studies, a loss dummy (*LOSS*) is defined equal to one if the company makes a loss in any of the past three years. These risk variables are expected to be positively associated with audit fees. On the other hand, the hypothesized relation between client risk and audit firm size is ambiguous. More risky companies may prefer to hire large audit firms in order to reduce agency costs (Francis and Wilson, 1988; DeFond, 1992). On the other hand, large audit firms may be reluctant to accept high-risk clients because of the potential damage to their reputations or because of the threat of litigation (Krishnan and Krishnan, 1997).

A dummy (*BUSY*) is also included for the so-called 'busy period' of accounting firms, namely client year-ends falling between 1st December and 31st March inclusive.

Variables (Y_i) included in the Auditor Selection Models only

In order to identify the effects of selectivity bias (as captured by the $\sigma_{1u}\lambda_{1i}$ and $\sigma_{0u}\lambda_{0i}$ terms), it is necessary to include some variables in the auditor choice model, but to exclude them from the audit fee models. The Y_i variables that fulfil this role are defined in Table 1.

Audit firm size is expected to be positively associated with the proportion of directors who are non-executives (*NEX*) for at least two reasons. First, non-executive directors may have stronger preferences than executives for high quality (large) audit

firms. Second, companies with high demand for monitoring may have greater incentives to appoint non-executive directors and hire large audit firms.

Auditor choice is also hypothesised to depend on directors' personal affiliations with audit firms. Companies are expected to hire large (small) audit firms more often when directors disclose that they previously worked for large (small) audit firms.[19] The affiliation variables equal one if the company is affiliated with a large (*LAF*) or small (*SAF*) audit firm, respectively; otherwise they equal zero. Corporate affiliations with audit firms are discussed in more detail in Section 3.1.

Variable (Z_i) included in the Audit Fee Models only

An audit office location variable is included in the audit fee models but excluded from the auditor choice models. The location variable (*LON*) equals one if the audit office is located in London and zero otherwise. Prior research shows London offices charge higher audit fees compared to offices located outside of London (Chan et al., 1993). This controls for the effects of audit office location on audit fees.[20]

3. DATA

3.1 Data sources

The initial cross-sectional sample analysed in the chapter consists of 1,543 companies registered with a UK stock exchange. Data are taken from annual reports with year-ends between 1st March 1997 and 28th February 1998, and each company appears only once in the sample. The PricewaterhouseCoopers Corporate Register (PCR) is used to identify company auditors, audit office locations, company directors and corporate affiliations with audit firms. The PCR provides information on directors' career histories and their professional qualifications.

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[19] This may be because directors feel most comfortable hiring an audit firm with which they are familiar, but it may also be because clients recruit directors from their audit firms.

[20] In order to estimate the effects of auditor selection bias, it is not necessary to include a variable in the audit fee model but exclude it from the auditor choice model. Not surprisingly therefore, our selectivity results are robust to dropping audit location.

In deciding whether companies are affiliated with audit firms, we attempt to identify for each company the director who has the strongest boardroom influence over audit appointments. We generally assume finance directors are most influential as they have closest contact with audit firms. If a finance director discloses that he/she previously worked for a large (small) audit firm, we expect the company will be more likely to hire a large (small) audit firm. When a director discloses past employments with both large and small audit firms, we assume the affiliation is with the most recent audit firm.

In approximately 10% of sample companies, finance directors are not identified. In such cases we adopt the following rules for choosing the most influential directors:

(a) We choose the company secretary, if (i) the company secretary is a qualified accountant, or (ii) neither the company secretary nor the CEO nor the Chairman are qualified accountants. We rank the company secretary above the CEO and Chairman in terms of influence, because the posts of company secretary and finance director are often carried out by the same person.

(b) We choose the CEO, if (i) the CEO is a qualified accountant and the company secretary is either not qualified or not identified, or (ii) neither the CEO nor Chairman are qualified accountants and the company secretary is not identified.

(c) We choose the company chairman, if (i) the chairman is a qualified accountant and neither the CEO nor company secretary are qualified, or (ii) neither the CEO nor company secretary are identified.

These rules enable us to identify an influential director for each company. Since directors frequently do not disclose full career histories in the PCR, it is likely that some directors previously worked for audit firms but do not disclose this, perhaps

because the employment was a long time ago or because it was for a relatively short period. We do not believe this lack of disclosure presents a serious problem since directors may disclose past audit employments more readily when personal affiliations are particularly strong.[21]

Information on SIC codes and subsidiaries is collected from Extel. Data on audit fees, assets, sales, profits, gearing and directors (executive or non-executive) are collected from Datastream. Because of missing Datastream data for 217 companies, the final sample consists of 1326 observations.

3.2 Descriptive statistics

Descriptive statistics for the dependent and explanatory variables are reported in Table 2. Audit fees (*AF*) range from a minimum of £2,000 to a maximum of £9.6m, with mean and median values of £243,000 and £73,000 respectively. Large audit firms (*BIG*) are chosen by 76% of sample companies and 43% of companies are audited by offices located in London (*LON*).

The mean values for assets (*ASSE*) and sales (*REV*) are £343m and £519m, respectively. The means for these size variables are much larger than their medians (£28m and £61m, respectively) as there are relatively few very large companies. The number of main SIC codes (*SIC*) ranges from one to ten and there is also a considerable range in the number of domestic (*DS*) and overseas subsidiaries (*OS*).

[21] Since there is no reason to believe that measurement error is correlated with auditor choice, bias is unlikely to be a problem. A potentially more important problem is that measurement error may increase coefficient standard errors. However, the affiliation variables have statistically significant effects on auditor choice, indicating that lack of precision is not a serious problem.

Table 2
Descriptive Statistics

Variable	*Mean*	*Median*	*Minimum*	*Maximum*
AF	243	73	2	9,600
BIG	0.76	1	0	1
ASSE	343,585	28,431	-13,579	42,400,000
REV	519,499	60,647	0	56,666,666
SIC	2.96	2	1	10
DS	5.73	4	0	53
OS	4.25	1	0	96
LOSS	0.22	0	0	1
GEAR	33.38	27.15	-4,552	3,020
BUSY	0.48	0	0	1
NEX	0.30	0.3	0	0.8
LAF	0.25	0	0	1
SAF	0.05	0	0	1
LON	0.43	0	0	1

Notes:
See Table 1 for variable definitions. The *AF*, *ASSE* and *REV* variables are in £'000s.

Only 22% of companies make accounting losses (*LOSS*) in one or more of the past three years and there is considerable variation in gearing levels (*GEAR*). Nearly half of the companies (48%) have year-ends in the four-month busy period (*BUSY*). The average proportion of directors who are non-executives (*NEX*) is 30% and ranges from zero to 80%.

Affiliations with large audit firms (*LAF*) are disclosed by 25% of influential directors and affiliations with small audit firms (*SAF*) are disclosed by a further 5%.

The remaining 70% either did not previously work for audit firms or do not disclose past audit employments. As explained above, these directors are categorised as having no affiliations with audit firms.

3.3 Rank Transformations

The means and medians reported in Table 2 reveal skewness in the distribution of the audit fee (*AF*), company size (*ASSE* and *REV*), complexity (*SIC*, *DS* and *OS*) and gearing (*GEAR*) variables. Two statistical problems faced by previous audit fee studies are skewness and outlying observations. Some researchers control for the former problem using log transformations (e.g., Francis and Simon, 1987; Simon and Francis, 1988; Chan et al., 1993; Craswell et al., 1995). Outlying observations have generally been confronted by trimming or truncating sample distributions. This is the approach adopted in Chapter 3. However, because the estimation of the selection model relies upon the assumptions concerning the behaviour of the residuals in equations (3.4) and (3.5), rank transformations are used here instead.

Kane and Meade (1998) show rank transformations perform better in resolving skewness and outlier problems, by retaining information that is obfuscated by untransformed or alternative transformations such as log or square root transformations. The procedure involves replacing each observation with its rank within the sample and then dividing each observation by N+1 (where N is the number of observations). Thus, the ranked variables are uniformly distributed between zero and one.

Simulation studies indicate little loss of efficiency when rank transformations are applied to (already) normally distributed variables (Conover and Iman, 1980; Iman and Conover, 1979). Rank transformations have previously been used in event studies (Beaver et al., 1979; Cheng et al., 1992) and accounting disclosure studies

(Lang and Lundholm, 1996; Wallace et al., 1994; Wallace and Naser, 1995). I test whether two alternative specifications result in better audit fee models in Appendix B, namely using untransformed variables (Specification 1) or log-transformed dependent, size, complexity and gearing variables (Specification 2).

I find log transformations do not satisfactorily remove the estimation problems associated with highly skewed variables. In addition, sample trimming and truncation to deal with outliers is associated with loss of information. Consistent with Kane and Meade (1998), I find rank transformations result in residuals which conform more closely to OLS assumptions. The residuals are normally distributed, spherical and uncorrelated with the explanatory variables. Maddala (1983) discusses the importance of the normality of the distribution of the disturbances in the second-stage regression equations of a selection model.

The audit fee (*AF*), company size (*ASSE* and *REV*), complexity (*SIC*, *DS* and *OS*) and gearing (*GEAR*) variables are replaced with their rank-transformed equivalents (*R*(*AF*), *R*(*ASSE*), *R*(*REV*), *R*(*SIC*), *R*(*DS*), *R*(*OS*) and *R*(*GEAR*)). Table 3 partitions the sample into 1013 clients of large audit firms and 313 clients of small audit firms and reports descriptive statistics for the rank-transformed and other variables (*LOSS*, *BUSY*, *NEX*, *LAF*, *LAF*, *LON*).

The audit fee (*R*(*AF*)) variable confirms that large audit firms' clients pay significantly higher fees than small audit firms' clients. The company size (*R*(*ASSE*) and *R*(*REV*)) and complexity (*R*(*SIC*), *R*(*DS*), *R*(*OS*)) variables show large audit firms' clients are significantly larger and more complex than small audit firms' clients. The loss dummy (*LOSS*) and gearing (*R*(*GEAR*)) show large audit firms' clients are more profitable and more highly-geared than small audit firms' clients.

Table 3

Descriptive Statistics for the Clients of Large and Small Audit Firms.

	Large audit firms (*BIG* = 1)				Small audit firms (*BIG* = 0)	
Variable	*Mean*		*Median*		*Mean*	*Median*
R(AF)	0.5692	**	0.6059	**	0.2994	0.2495
R(ASSE)	0.5411	**	0.5588	**	0.3081	0.2723
R(REV)	0.5789	**	0.6058	**	0.3430	0.2997
R(SIC)	0.5302	*	0.6243	**	0.4838	0.4057
R(DS)	0.5049	**	0.4915	**	0.4083	0.3969
R(OS)	0.5455	**	0.5678	**	0.4029	0.2567
LOSS	0.2024	**	0		0.2716	0
R(GEAR)	0.5042	**	0.4993	**	0.4449	0.4269
BUSY	0.4985	**	0		0.4026	0
NEX	0.3061	**	0.3077	**	0.2702	0.2857
LAF	0.2774	**	0		0.1565	0
SAF	0.0306	**	0		0.1022	0
LON	0.4087	**	0		0.5144	1
Observations	1013				313	

Notes:

The *R(AF)*, *R(ASSE)*, *R(REV)*, *R(SIC)*, *R(DS)*, *R(OS)*, and *R(GEAR)* variables are rank-transformations of *AF*, *ASSE*, *REV*, *SIC*, *DS*, *OS* and *GEAR*. See Table 1 for variable definitions.

** (*) Significant difference between large and small audit firms' clients at the 1% (5%) levels.

The association between large audit firms and the proportion of directors who are non-executives (*NEX*) is positive and significant. This is consistent with audit and board quality being complementary and with non-executives preferring large audit firms. Companies hire large audit firms more often when influential directors are affiliated with large audit firms (*LAF*). Similarly, companies hire large audit firms less often when directors are affiliated with small audit firms (*SAF*).

4. ESTIMATION RESULTS

4.1 An overview

This section evaluates the effects of auditor selection bias on the size of the large audit firm fee premium. First, the approach of previous studies is replicated by treating auditor choice as exogenous as in the following model:

$$AF_i = \beta_0 + \beta'_1 X_i + \beta'_2 Z_i + \beta_3 AUD_i + u_i$$

Consistent with extant research, we find a significant positive coefficient on the audit firm size dummy ($\hat{\beta}_3 > 0$).

Next, the auditor selection model

$$AUD_i^* = \gamma_0 + \gamma'_1 X_i + \gamma'_2 Y_i + v_i \equiv \gamma' W_i + v_i$$

Is estimated. The results are used to construct inverse Mills ratios ($\hat{\lambda}_{1i}$ and $\hat{\lambda}_{0i}$):

$$\hat{\lambda}_{1i} \equiv \frac{\phi(\hat{\gamma}' W_i)}{\Phi(\hat{\gamma}' W_i)} \text{ and } \hat{\lambda}_{0i} \equiv \frac{\phi(\hat{\gamma}' W_i)}{1 - \Phi(\hat{\gamma}' W_i)}.$$

Next, audit fee models for the clients of large and small audit firms are estimated in order to evaluate the effects of selection bias.

$$R(AF_{1i}) = \beta_{10} + \beta'_{11} X_i + \beta'_{12} Z_i + \sigma_{1u} \hat{\lambda}_{1i} + e_{1i}$$

$$R(AF_{0i}) = \beta_{00} + \beta'_{01} X_i + \beta'_{02} Z_i + \sigma_{0u} \hat{\lambda}_{0i} + e_{0i}$$

Allowing for selectivity effects, the estimated fee premium is significantly larger than when selectivity is ignored (i.e., $\hat{\beta}_{10} > \hat{\beta}_{00} > \hat{\beta}_3 > 0$). Moreover, the coefficients on the inverse Mills ratios are significantly negative for large audit firms' clients ($\hat{\sigma}_{1u} < 0$) and weakly positive for small audit firms' clients ($\hat{\sigma}_{0u} \geq 0$). These results are consistent with selectivity effects being caused by unobserved quality differences between large and small audit firms' clients.

4.2 The Large Audit Firm Fee Premium Ignoring Selectivity

Table 4 reports the results from audit fee regressions when the effects of auditor selection are ignored. Column 1 replicates the approach of previous studies by including audit firm size (AUD_i) as an exogenous predictor of audit fees (equation (3.1)). Columns (2)-(3) estimate audit fee regressions separately for large and small audit firms' clients (equations (3.4) and (3.5)) but do not control for selectivity.

The results in Column 1 are consistent with those reported in prior audit fee studies. The coefficient on audit firm size is positive ($\hat{\beta}_3 = 0.05$) and statistically significant. Therefore, large audit firms' clients pay higher fees than small audit firms' clients after controlling for observed client characteristics (X_i) and audit office location (Z_i). The estimated premium ($\hat{\beta}_{10} - \hat{\beta}_{00}$) in Columns 2 and 3 is 0.06 (= -0.12 - (-0.18)), which is not significantly different from the 0.05 estimate in Column 1. The insignificant difference is unsurprising as the fee regressions in Table 4 treat auditor choice as exogenous.

The 0.06 estimate is used to calculate the median premium when selectivity effects are ignored. Since the median firm lies in the 50th centile and ranked audit fees are uniformly distributed between zero and one, the median premium is simply the difference in fees paid by companies in the 47th (= 0.5 - 0.03) and 53rd (= 0.5 +

0.03) centiles. Companies in the 47th and 53rd centiles pay fees of £65,000 and £79,000 respectively, giving a median premium of £14,000. As a percentage of median fees (£73,000) the premium is 19.2%, similar to the 24% premium estimated by Pong and Whittington (1994).

Table 4
Audit Fee Models Ignoring Selectivity Effects.

	Expected sign	*R(AF)*	*R(AF$_1$)*	*R(AF$_0$)*
R(ASSE)	+	0.16	0.15	0.17
		(6.28)**	(5.35)**	(3.25)**
R(REV)	+	0.59	0.60	0.57
		(21.93)**	(19.79)**	(9.33)**
R(SIC)	+	0.06	0.05	0.05
		(4.96)**	(4.02)**	(2.22)*
R(DS)	+	0.09	0.07	0.18
		(6.97)**	(4.69)**	(5.95)**
R(OS)	+	0.23	0.24	0.19
		(17.76)**	(17.02)**	(5.99)**
LOSS	+	0.04	0.05	0.02
		(5.22)**	(5.11)**	(1.59)
R(GEAR)	+	0.05	0.06	0.05
		(4.76)**	(4.03)**	(2.60)**
BUSY	+	0.01	0.02	0.01
		(2.33)*	(2.39)*	(0.37)
LON	+	0.05	0.05	0.04
		(7.89)**	(6.75)**	(3.72)**
BIG	+	0.05	.	.
		(6.80)**	.	.
CONSTANT	?	-0.18	-0.12	-0.18
		(-18.45)**	(-9.69)**	(-9,77)**
Observations		1326	1013	313
R^2		86.6%	84.7%	82.4%

Notes:
Column 1 includes audit firm size as a dummy variable (Eq. (3.1)). Columns 2 and 3 are estimated separately for large and small audit firms' clients (Eqs. (3.4) and (3.5)).
The *i* subscripts have been dropped from variable names.
t-statistics are given in parentheses.
** (*) Significant at the 1% (5%) levels.
See Tables 1 and 3 for variable definitions.

In Columns 2 and 3, the coefficient signs are the same for large and small audit firms and, in general, there are no significant differences between coefficient estimates (β'_{1i}

$= \beta'_{01}$ and $\beta'_{12} = \beta'_{02}$). The only exception is the domestic subsidiaries variable ($R(DS)$), which has a significantly smaller impact on the fees of large audit firms' clients (0.07) than on the fees of small audit firms' clients (0.18). This is possibly due to large audit firms having more offices and therefore lower transport costs compared to small audit firms.

As expected, there is a significant positive relation between company size ($R(ASSE)$ and $R(REV)$) and audit fees. In addition, audit fees are positively associated with client complexity as measured by the number of SIC codes ($R(SIC)$) and the number of domestic ($R(DS)$) and overseas ($R(OS)$) subsidiaries. High-risk companies are charged higher fees, as shown by the significant positive coefficients on the loss dummy ($LOSS$) and gearing ($R(GEAR)$). Audit fees are also higher during the busy season ($BUSY$) and when audit offices are located in London (LON).

4.3 Evaluating the Effects of Selection Bias on Audit Fees

Table 5 reports the effects of selectivity using the two-stage approach. In the first stage, the auditor selection models are estimated (Columns 1 and 2). In the second stage, the audit fee regressions are estimated for large and small audit firms' clients taking into account selectivity effects (Columns 3 and 4).[22] Columns 1 and 2 correspond to equation (3.3) while Columns 3 and 4 correspond to equations (3.6) and (3.7).

In Columns 1 and 2, the coefficient estimates for the auditor choice models are consistent with prior expectations.[23] The coefficients on the company size variables ($R(ASSE)$ and $R(REV)$) show large companies hire large audit firms more often than small audit firms. Companies also hire large audit firms more often when they have

[22] To assess the validity of the auditor choice models, simulated residuals are generated. No evidence of heteroscedasticity or omitted variables problems (Gourieroux et al., 1987) is found.
[23] The R^2s in Columns (1)-(2) are the pseudo R^2s that one obtains from probit models.

subsidiaries located overseas (*R(OS)*). Affiliations between audit firms and influential directors (*LAF* and *SAF*) are also important in explaining auditor choice, and Companies hire large (small) audit firms more often when directors disclose past employments with large (small) audit firms.

Table 5
Evaluating the Effects of Auditor Selection Bias on Audit Fees

	Exp'd sign	*BIG**	*BIG**	*Exp'd sign*	*R(AF1)*	*R(AF0)*
R(ASSE)	+	0.73	0.72	+	0.12	0.15
		(2.65)**	(2.65)**		(4.07)**	(2.62)**
R(REV)	+	1.66	1.49	+	0.54	0.53
		(5.36)**	(5.22)**		(15.82)**	(7.60)**
R(SIC)	+	-0.23	.	+	0.05	0.06
		(-1.38)	.		(4.20)**	(2.29)*
R(DS)	+	-0.28	.	+	0.07	0.18
		(-1.55)	.		(4.60)**	(5.93)**
R(OS)	+	0.53	0.50	+	0.22	0.18
		(2.84)**	(2.72)**		(14.77)**	(5.64)**
LOSS	?	0.37	0.37	+	0.04	0.01
		(3.47)**	(3.50)**		(3.15)**	(0.78)
R(GEAR)	?	0.08	.	+	0.06	0.05
		(0.52)	.		(4.12)**	(2.62)**
BUSY	?	0.07	.	+	0.02	0.01
		(0.80)	.		(2.46)*	(0.35)
LON		.	.	+	0.05	0.04
		.	.		(6.92)**	(3.77)**
LAF	+	0.29	0.29		.	.
		(2.78)**	(2.76)**		.	.
SAF	-	-0.55	-0.56		.	.
		(-3.07)**	(3.13)**		.	.
NEX	+	2.17	2.19		.	.
		(3.99)**	(4.02)**		.	.
$\hat{\lambda}_1$		.	.	-	-0.09	.
		.	.		(-3.02)**	.
$\hat{\lambda}_0$		.	.	+	.	0.04
		.	.		.	(1.19)
CONSTANT	?	-1.19	-1.27	?	-0.03	-0.19
		(-5.85)**	(-6.61)**		(-0.96)	(-9.08)**
Observations		1326	1326		1013	313
R^2		18.9%	18.5%		84.8%	82.5%

Notes:
Columns 1 and 2 are probit auditor choice models (Eq. (3.3)). Columns 3 and 4 are audit fee regressions for large and small audit firms' clients (Eqs. (3.6) and (3.7)).
z- and t-statistics are given in parentheses. ** (*) Significant at the 1% (5%) levels.

See Tables 1 and 3 for variable definitions.

Finally, audit firm size is also positively associated with the proportion of directors who are non-executives (*NEX*). This suggests either non-executives have stronger preferences for large audit firms or board and audit monitoring are complementary activities. The remaining explanatory variables (*R*(*SIC*), *R*(*DS*), *R*(*GEAR*) and *BUSY*) do not significantly affect auditor choice and are omitted from Column 2.

The results in Column 2 are used to construct the inverse Mills ratios ($\hat{\lambda}_1$ and $\hat{\lambda}_0$), which are included in Columns 3 and 4 in order to control for selectivity effects. Column 3 (equation (3.6)) is estimated for large audit firms' clients while column 4 (equation (3.7)) is estimated for small audit firms' clients. After controlling for selectivity, the estimated fee premium ($\hat{\beta}_{10} - \hat{\beta}_{00}$) is 0.16 (= -0.03 - (-0.19)). The difference between the estimated premia in Tables 4 and 5 (0.06 and 0.16) is statistically significant at the 1% level. The effect of selectivity on the fee premium is also significant from an economic point of view. The 0.16 estimate is used to calculate the median premium taking into account selectivity effects. Companies in the 42nd (= 0.5 - 0.08) and 58th (= 0.5 + 0.08) centiles pay fees of £52,000 and £91,000 respectively, giving a median premium of £39,000. As a percentage of median fees (£73,000) the premium is 53.4%. The large audit firm fee premium is therefore more than twice as large when one controls for auditor selection bias (53.4% compared to 19.2%).

The effects of selectivity can also be seen from the coefficients on the inverse Mills ratios ($\hat{\lambda}_1$ and $\hat{\lambda}_0$). The coefficient for large audit firms' clients in Column 3 is negative and statistically significant ($\hat{\sigma}_{1u} < 0$). This means large audit firms' clients pay lower fees than randomly selected companies would pay to large audit firms (i.e.,

$\hat{\sigma}_{1u}\hat{\lambda}_1 = E[u_1 \mid BIG = 1] < 0 \Leftrightarrow E[AF_1 \mid BIG = 1] < E[AF_1])$. The coefficient for small audit firms' clients in Column 4 is positive but not statistically significant ($\hat{\sigma}_{1u} \geq 0$). This means small audit firms' clients pay fees that are at least as high as randomly selected companies would pay to small audit firms (i.e., $\hat{\sigma}_{0u}\hat{\lambda}_0 = E[u_0 \mid BIG = 0] \geq 0$ $\Leftrightarrow E[AF_0 \mid BIG = 0] \geq E[AF_0])$. These results are consistent with selectivity effects being caused by unobserved quality differences between large and small audit firms' clients. In particular, high quality companies tend to hire large audit firms and pay lower audit fees.

5. CONCLUSIONS

After controlling for client characteristics, studies often find large audit firms earn significantly higher fees than small audit firms. However, extant research on audit fees treats auditor choice as exogenous. In contrast, this chapter takes into account that companies are not randomly assigned to audit firms. This chapter examines the large audit firm fee premium when auditor choice is treated as endogenous.

The effects of audit firm selection on audit fees are found to be statistically and economically significant. The premium earned by large audit firms is more than twice as large when selectivity bias is taken into account (53.4% compared to 19.2%). The importance of selectivity effects should not be too surprising given the predictions of analytical studies. Theory suggests high quality companies are more likely to hire large audit firms and are more likely to pay low fees (Titman and Trueman, 1986; Thornton and Moore, 1993). These results suggest large audit firms attract clients that are of higher than average quality and require less than average audit effort. Previous fee studies significantly underestimate the returns attributable to higher audit quality, because they ignore the advantageous (adverse) selection effects experienced by large (small) audit firms. A task for future research is to

estimate the effects of selectivity on audit fees in countries where large audit firm premia have not yet been found.

CHAPTER 3

DOES ONE SIZE FIT ALL? EVIDENCE FROM A MULTINOMIAL LOGIT MODEL FOR PREDICTING AUDIT REPORTS IN THE UK

1. INTRODUCTION

This chapter provides evidence of the association between published audit reports and observable company characteristics in the UK, including chosen audit firm size. It is the first study to do so comprehensively for a wide range of UK companies and audit report types.

Prior studies of audit reporting in the UK focus on either the 'small company' audit qualification (Keasey et al., 1988), or going-concern related audit modifications (e.g. Lennox, 1999a; Citron and Taffler, 1992, 2000). The 'small company' qualification is no longer relevant since the introduction of small company audit exemptions in 1994. However, there are several other possible audit report modifications that may be issued in addition to those related to going-concern. Other modified audit reports are issued for reasons including disagreements (for example, over accuracy, accounting treatment or disclosure) and limitations on scope (lack of audit evidence).[24]

This chapter is the first study to analyse the choices of both going-concern and non going-concern related audit modifications in the UK. Furthermore, it is the first such study internationally to distinguish different modification types which is not

[24] Modified audit reports are defined as any audit report other than a clean audit report. They include reports where the auditor has qualified her opinion as to the truth and fairness of the accounts, and reports where the opinion is unqualified but which include additional explanatory material.

limited to uncertainty modifications (of which going-concern related modifications are a subset). In this study, the non going-concern related audit modifications include disagreements and limitations on scope, and are treated separately from going-concern modifications. Most prior studies of audit reporting outside the UK focus on uncertainty modifications. In contrast, DeFond et al. (2000) analyse audit modifications in China which include uncertainties, limitations on scope and GAAP violations (disagreements), but do not distinguish between types of modification.

Prior UK studies are also limited by the type of companies analysed. Keasey et al. (1988) examine audit qualifications on single plant, independently owned UK manufacturing companies. These are very small companies. Lennox (1999a) and Citron and Taffler (1992 and 2000) analyse going-concern related audit modifications on listed UK companies. These are very large, publicly owned companies. In contrast, this paper is the first study to examine audit reporting outcomes on both public and private UK companies. The public companies analysed here include both listed and non-listed companies.

Prior studies undertaken in other countries also analyse only listed companies. Dopuch et al. (1987), Bell and Tabor (1991) and Louwers (1998) estimate models of audit qualifications related to uncertainties in companies listed on the New York and American Stock Exchange. Monroe and Teh (1993) estimate a model of uncertainty audit qualifications on listed Australian companies. DeFond et al. (2000) analyse modifications on companies listed on the Shanghai and Shenzhen stock exchanges. It is possible that audit reporting on private or public but not listed companies differs from reporting on listed companies, because of greater separation of ownership from control, closer public scrutiny, or tighter regulations for listed companies. Therefore,

the results of these studies do not necessarily apply to non-listed companies in the UK.

This chapter extends the literature in several ways. Prior studies of audit reporting in the UK focus on either small, private companies, or large, listed companies. Prior studies outside the UK focus only on listed companies. In contrast, this chapter analyses both public and private, listed and non-listed, companies.

The second way in which this chapter extends the literature, is through the analysis of non going-concern related modifications such as disagreements and limitations on scope. Importantly, these modifications are treated separately from going-concern related modifications. Prior studies either do not examine these modifications, or do not distinguish them from going-concern related modifications.

In addition, this chapter assesses the ability of the model estimated to successfully predict audit report type. Models which predict audit reporting have several uses, proposed by Dopuch et al. (1987). Auditors may use the models to screen potential clients, or to provide a benchmark representing the probability that a 'typical' auditor would issue a modified audit report on a given company. Screening would enable auditors to reject potential clients which are likely to require modification. These 'low quality' clients represent high litigation risk for auditors who fail to issue modifications when required. Benchmarks would be of use in peer review and court cases dealing with auditor negligence. Researchers would be able to use a model which predicted audit reports to assess the extent to which markets expect a modified audit report to be issued. This would be of use in tests of market efficiency or the information content of audit reports.

1.1 Outline of Chapter

The empirical results reported here are obtained from the estimation of a multinomial logit model. The discrete dependent variable in this model takes the value 2 if the company receives a going-concern related modification, 1 if the company receives a non going-concern related audit modification, and 0 otherwise. These are categories and the coding is chosen merely for convenience, giving neither a ranking nor a count.

The explanatory variables included in the multinomial model relate to audit firm size and fees, and observable company characteristics. Auditor characteristics such as audit quality and independence are expected to have similar effects on both types of audit modifications, but are not directly observable and are proxied by audit firm size and fees. Company characteristics are expected to influence going-concern and non going-concern related audit modifications in different ways.

For example, going-concern related modifications will be issued when the auditor feels that there is a significant chance that the company will not continue in operation for the foreseeable future. Hence, company characteristics that are known to be important in predicting bankruptcy will also be important in determining going-concern audit modifications. However, characteristics which are important in bankruptcy may not influence or may differently influence non going-concern related audit modifications. For example, financial statements that indicate poor liquidity are likely to increase the probability of a going-concern audit modification, but may reduce the probability of a non-going concern audit modification as the financial statements are more likely to be correctly stated.[25]

[25] Companies which are financially stressed may face increased incentives to engage in earnings management to overstate their assets and/or income, for example, to avoid debt covenant violation (Watts and Zimmerman, 1986; Christie, 1990; Holthausen and Leftwich, 1983). Such overstatements would increase the likelihood of a non going-concern related audit modification. However, we cannot observe earnings management attempts, only the published financial statements which are inclusive of any such attempts. Financial statements which report an unfavourable position are therefore less likely

The model is estimated over both public and private companies. The frequency of modified audit reports may differ between public (listed or not) and private companies. In particular, public companies are generally subject to a greater separation of ownership from control, and face different legislative requirements. Section 2 outlines the major differences between public unlisted, listed, and private companies in the UK. Importantly, external financial audits are mandatory for all public companies in the UK, no matter how large or small, whereas sufficiently small private companies may be exempt.[26] This suggests that audit reports may serve differing degrees of usefulness in different types of companies.

Section 3 describes the multinomial logit model and motivates its choice. Section 4 motivates the choice of dependent and explanatory variables included in the model. Section 5 describes the data collection and provides some descriptive statistics. Public companies are generally larger and, on average, pay higher fees, have higher gearing and liquidity, and are more likely to pay dividends. There is strong persistence in audit reporting. Out of a total of 9,304 companies analysed, 662 receive first-time modifications, whereas 1,517 receive repeated modifications.

Section 6 contains the results of the estimations. Company size is positively related to non going-concern related modifications, but negatively related to going-concern modifications. Variables reflecting company financial health, such as gearing and liquidity, are found to be important for going-concern modifications only. In contrast, companies hiring large audit firms are significantly less likely to receive non

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to have been influenced by earnings management that financial statements which report favourable positions.

[26] For the date of the company year-ends used in this study, the general requirements that a private company must have met in order to qualify for an audit exemption were: that the company must qualify as 'small' for the purposes of filing abbreviated accounts, must have turnover of no more than £350,000, and total assets of no more than £1.4 million, although additional restrictions apply to certain types of company where there is deemed to be a public interest. At the time of writing, the turnover limit has been increased to £1 million and there are indications that it may be further raised to the maximum currently allowed under EU law, namely £4.8 million.

going-concern related modifications. Audit and non-audit fees are not found to be significant in determining either modification type. The presence of prior-year audit report modifications of either type are positively related to both modification types in the current year.

Section 7 discusses the predictive power of the model, and concluding remarks are presented in Section 8. The improvement in the predictive power of the multinomial logit model over both a standard dichotomous logit model and a naïve prediction strategy is found to be marginal. I suggest that this is due to the strong pattern of persistence in audit reporting.

The remainder of this section discusses the relevant prior research in more detail.

1.2 Prior Research

Research on non going-concern related audit modifications is limited. The 'small company' UK audit qualifications examined by Keasey et al. (1988) no longer apply since Statement of Auditing Standards (SAS) 600 (APB, 1993) came into force in the UK in September 1993, and small company audit exemptions were introduced. DeFond et al. (2000) include both going-concern and non going-concern related audit modifications in their study, but do not distinguish the different types, so it is not possible to determine which factors are important for uncertainty modifications relating to going-concern, and which are important for audit modifications related to disagreements or limitations on scope (of which disclaimers of opinion are a subset). Other studies of audit reporting focus on going-concern related audit modifications, or the more general class of uncertainty modifications, and do not consider modifications related to disagreements or limitations on scope.

Of the studies focusing on uncertainty modifications, Monroe and Teh (1993) include a good summary of audit reporting studies prior to 1993. Monroe and Teh note that these studies can be divided into those which predict going-concern related modifications (Mutchler, 1984, 1985, 1986; Levitan and Knoblett, 1985; and Menon and Schwarz, 1987) and those which predict uncertainty modifications in general (Bell and Tabor, 1991; and Dopuch et al., 1987). Monroe and Teh examine the general class of uncertainty modifications. These 'subject to' audit modifications, which include material uncertainties affecting asset realisation or litigation against the client, no longer exist in the UK or the US. Such items, if material, would be reported instead as fundamental uncertainties not related to going-concern, and are included as non going-concern related audit modifications for the purposes of this study.

More recently, Krishnan (1994) models uncertainty audit opinions in a study of auditor switching by US companies. Lennox (1999a) and Citron and Taffler (2000) study going-concern related audit modifications on listed UK companies, but their goals are, respectively, to compare the accuracy of audit reporting to bankruptcy prediction models, and to determine the impact of the introduction of SAS 600 on audit reporting. Louwers (1998) studies going-concern related audit modifications on the subset of financially stressed, listed US companies.

These prior studies use discrete choice models where the dependent variable is dichotomous, taking only two values (0 and 1). Dopuch et al. (1987) and Lennox use probit models with binary dependent variables; Keasey et al., Bell and Tabor (1991), Monroe and Teh, Louwers, DeFond et al. and Citron and Taffler use logit models with binary dependent variables.

In contrast, Krishnan (1994) uses an ordered probit model. In such a model, the dependent variable takes more than two values, *and* the order or ranking of these

values is important. Instead, I use a multinomial logit model. In my model, although the dependent variable also takes more than two values, the order or ranking of these values is meaningless and is chosen for convenience only. This has the advantage that the model does not impose that a particular outcome (modification) type is more or less important than any other. The motivation for the choice of the multinomial logit model used in this chapter is discussed in more detail in Section 3.

2. PUBLIC AND PRIVATE COMPANIES IN THE UK

Limited companies in the UK may be either 'public' or 'private', as indicated in the company's name ('plc' or 'Ltd' respectively) and memorandum of association. Public companies must comply with stricter legislation under the Companies Acts governing such matters as the minimum numbers of directors and members, minimum amounts of issued and authorised share capital, and filing deadlines. However, they have more ready access to finance as they are allowed to issues shares to the public through a recognised stock exchange. Public companies may also advertise any of the company's securities for sale to the public. In contrast, private companies may not sell shares or advertise the sale of securities to the public, but may be eligible to audit exemptions. The main differences between public and private companies are summarised in Table 1.

It can be seen from Table 1 that, although some large private companies may share features such as closer public scrutiny with some public or listed companies, and some small public companies may share features such as owner-managers with some private companies, public companies are generally larger than private companies due to the existence of minimum restrictions on issued share capital. They are also in general more widely held, and have shorter filing deadlines.

Table 1
Public and Private Companies in the UK

Company type:	*Private*	*Public*
Minimum number of members	1	2
Minimum number of directors	1	2
Company secretary	1, no formal qualifications	1, suitably qualified
Minimum authorised share capital	n/a	£50,000
Minimum issued share capital	n/a	£50,000
Minimum paid-up share capital	n/a	¼ of nominal value of each allotted share, plus the whole of any premium
Filing deadline for annual accounts	10 months	7 months
Audit exemption available for companies meeting certain requirements?	Yes	No
Access to capital markets	May not sell shares to the general public	May sell shares to the general public

2.1 Listed Companies

Public companies may be listed on (registered with) a recognised stock exchange. Private companies may not be listed because they are not permitted to sell shares to the general public. Recognised stock exchanges in the UK include the main market on the London Stock Exchange (LSE), and the Alternative Investments Market (AIM). In order to become a member of the LSE a company must, among other requirements, have a total market capitalisation of at least £700,000 and, after the listing, have at least 25% of its share capital in public hands. AIM has no such minimum requirements as it is a market for young, expanding businesses.

Once a company has become a member of either stock exchange it must meet obligations concerning the timely and accurate disclosure of any price-sensitive information, greater disclosure of directors' activities, and restrictions on directors' share dealing. Significant changes in substantial shareholdings must also be

disclosed. Price-sensitive information relates to significant changes in the company's financial position or outlook.

2.2 The Influence of Company Type on Audit Reporting

Auditors' decisions to issue modified audit reports depend partly upon detection of material errors and omissions, and partly upon the incentives that they face to report their audit findings truthfully. Auditors face legal and reputational incentives to report truthfully (e.g. DeAngelo, 1981; Dye, 1993), but also face client switch threats which may prevent truthful reporting where their independence has been compromised. Farmer et al. (1987) find that auditors are more likely to accept controversial accounting treatments when the risk of client loss is high and the risk of litigation is low. However, Louwers (1998) finds no evidence that factors related to litigation or loss of client revenues influence the auditor's decision to disclose going-concern uncertainties. Nevertheless, companies have been shown to switch auditor more frequently after receiving modified audit reports (Chow and Rice, 1982; Craswell, 1988; and Citron and Taffler, 1992).

Both switch threats and litigation/reputation effects are likely to be more important where clients are more publicly visible, i.e. listed versus unlisted companies, or public versus private companies. This is because clients are more prestigious, hence auditors will be reluctant to lose their business, but equally the auditors may be more likely to be sued or suffer adverse publicity in the event of an audit failure (a failure to issue a modified audit report when one is required). If switch threats dominate, then auditors can be expected to be less willing to issue audit report modifications. However, if litigation/reputation threats dominate, then auditors can be expected to be more likely to issue modifications.

These effects will be investigated by including, in the multinomial logit model of audit reporting, explanatory variables indicating whether companies are public, and whether they are listed.

3. THE MULTINOMIAL LOGIT MODEL

The main model estimated in this chapter is a multinomial logit model of the following form:

$$\Pr(Q_i = 0) = \frac{1}{1 + \sum_{k=1}^{2} e^{\beta_k' X_i}} \tag{3.1}$$

$$\Pr(Q_i = j) = \frac{e^{\beta_j' X_i}}{1 + \sum_{k=1}^{2} e^{\beta_k' X_i}} \quad \text{for } j = 1, 2 \tag{3.2}$$

where 'Q_i' indicates the type of audit report on the current financial statements of company i. X is a vector of explanatory variables, and β_j are the coefficients to be estimated relating to outcome j. Two different modified audit report outcomes (Q_i = 1, 2) will be considered relative to the base outcome of a clean audit report (Q_i = 0), but note that (3.2) can easily be extended to the case of more than three alternative outcomes (j, k = 1, 2, ..., J). However, due to limitations of the audit report data (discussed later in this section), only three outcome categories are specified in my model. These are the base outcome clean audit report, and two types of modification – those related to going-concern, and those not related.

In addition, a 'standard' dichotomous logit model of audit reporting is estimated for comparative purposes. This version of the model does not distinguish between different modification types. Its dependent variable is therefore binary. It is equal to 1 if a(ny) modified report is received, and 0 otherwise.

Multinomial logit models are part of the general class of discrete choice, or 'qualitative response', models. These models are those in which the dependent

variable takes values 0, 1, 2 and so on. In some cases, for example Krishnan's (1994) ordered probit model, the values themselves are meaningful. However, in this chapter, they are merely a coding for some qualitative outcome. Here, the three different audit report outcomes are coded 0, 1, or 2, but these codings are meaningless in themselves. The codings serve merely to identify the different outcomes and do not imply any ranking or ordering in the multinomial model.

Discrete choice models in the literature are most often used where the dependent variable is dichotomous; in other words, where there are only two possible outcomes, such as would be the case in a model of labour force participation. There are two main forms that these models can take, namely 'logit' (logistic) models, and 'probit' models. These models are constructed by modelling the probability that outcome j occurs, and differ only in that the logit model assumes the logistic distribution and the probit model assumes the normal distribution. Maddala (1991) discusses the use of dichotomous discrete choice models in accounting research.

In most cases logit and probit models give qualitatively identical results, although one might expect the results to differ if there were either very few observations of one outcome type, or very wide variation in an important independent variable. It is however difficult to justify the choice of one model or the other on theoretical grounds, therefore the choice of one or other model is usually based on computational convenience (Greene, 1997; Maddala, 1991).

The maximum likelihood estimation of these two models is based on the iterative Newton-Raphson technique. This technique is relatively straightforward for the logit model, but less so for the probit model. In particular, multinomial probit models become so computationally difficult to estimate that logit models are usually

required for models with more than two alternative outcomes. I used multinomial logit rather than probit because of these computational difficulties.

Krishnan (1994) employs an ordered probit model using three outcomes in a study of auditor switching and uncertainty modifications. This is computationally easier than a multinomial probit model, but imposes on the model that certain audit modifications are more 'serious' than others. In Krishnan's case, he uses three categories of uncertainty-related modified audit reports: clean, non going-concern related, and going-concern related. Coding these various outcomes 0, 1, and 2 becomes meaningful in an ordered probit model - the outcome coded 2 is ranked as more serious than those coded 1 and 0.

Krishnan notes that the ordered probit approach has the advantage of distinguishing these different types of reports (as does the multinomial logit approach), and that it allows for a measure of auditor conservatism in terms of the relative threshold values for issuing each type of report. However, when considering audit modifications other than uncertainty modifications, as in this study, it would be unclear whether going-concern related modifications were indeed always more serious than a disagreement or a limitation on scope. A multinomial model is more appropriate in this case, as it does not impose any rankings, and therefore is used in this study.

To be valid, it is necessary that multinomial logit models satisfy the condition known as 'independence of irrelevant alternatives' (IIA). I use multinomial logit rather than probit because of the computational difficulties, despite the restrictiveness of the (IIA) assumption.

The model implies that $\ln\left(\frac{\Pr(Q_i = j)}{\Pr(Q_i = 0)}\right) = \beta_j' X_i$, or, in other words, that the odds ratio for outcome j relative to the base choice (outcome 0) is independent of the other alternative choices available. This IIA property may not be satisfied in practice. For example, it would not be satisfied if the choices analysed were travelling to work by train, by bus, in a mercedes, or in any other car. The property would however be satisfied if the choice were simply between train, bus, and (any) car.

I can illustrate the importance of this condition when using the model for prediction as follows. Suppose that, when the choices analysed are between train, bus and car, the model predicts that 60% of the population will travel by car, and 20% by bus. The odds ratio between cars and buses is 3:1. If cars are divided evenly between mercedes and other makes, by distinguishing the choices in this way, if the odds ratio remains constant we would now expect the model to predict that 30% of people travelled by mercedes, and 30% in other cars. But the actual odds ratio between each car type, and buses, is reduced to 1.5:1. The choice of 'mercedes' is no longer independent from the choice of either irrelevant alternative 'train' or 'bus' although the model will assume that they are. In order to maintain the odds ratio, half of the people travelling by bus would have to switch to using trains.

In this study, the outcomes are audit reports (not travel choices) which are categorised as clean reports, non going-concern related modified reports (relating to disagreements and limitations on scope), and going-concern related modifications.

Going-concern and non going-concern related audit modifications are generally issued for very different reasons and on these grounds there is no reason to believe that they would not be independent decisions; going-concern related modifications will be issued when the auditor feels that there is a significant chance

that the company will not continue in operation for the foreseeable future, whereas non going-concern related modifications generally arise where evidence is unavailable (limitations on scope qualifications) or where auditors and management disagree over accuracy, accounting treatment or disclosure (disagreement qualifications).

The exception is that non going-concern audit modifications may also be issued for uncertainties which are not deemed to affect going-concern. These uncertainties may be related to those which are deemed to affect going-concern, in all but magnitude. It is possible that the presence of these modifications may violate the IIA condition. The data includes 462 such audit reports, with unqualified opinions but which feature additional explanatory paragraphs not related to going concern.

The requirement of satisfying the IIA condition is important for the categorisation of outcomes for the study. Limitation on scope and disagreement qualifications may be either 'mild' or 'serious'. 'Serious' disagreement modifications, where the misstatement is so material as to affect the financial statements as a whole, are termed 'adverse opinions'. 'Mild' disagreement modifications, where the misstatement is material but does not affect the financial statements as a whole, are termed 'except for' disagreements. Similarly, 'serious' limitation on scope modifications are termed 'disclaimers of opinion' whereas 'mild' limitation on scope modifications include the phrase 'except for'.

In order to satisfy the IIA condition, like opinions should be classified together. Adverse opinions should be grouped with 'except for' disagreement opinions, and disclaimers of opinion should be grouped with 'except for' limitation on scope opinions. Hence, although audit modifications relating to, say, disagreements may be either serious 'adverse opinions' or relatively mild 'except for' opinions, they should not be treated as separate outcomes in the multinomial logit model. This

would be similar to distinguishing mercedes from other cars in the travel-to-work model.

Finally, although it is unlikely to violate IIA, it is not possible to use the data in this study to treat disagreement modifications separately from limitation on scope modifications. This is because the data source (see Section 5) classifies audit reports into either clean reports, or modification type as follows: fundamental uncertainties relating to going concern, 'mild' 'except for' disagreements, 'except for' limitations on scope, 'severe' adverse or disclaimer opinions, and reports featuring unqualified opinions but with additional explanatory paragraphs not related to going concern. Because there is only a single category of 'severe' opinions it is not possible to analyse limitations on scope separately from disagreements, due to the requirement for the independence of irrelevant alternatives. There are 222 observations in the data with audit reports classified as 'severe'.

It must also be noted that it is possible for companies to receive multiple audit modifications. However, the data source does not provide information explaining the categorisation of multiple modifications. I have assumed that any modified audit report which concerns going-concern, even in part, is classified as going-concern related.

4. VARIABLES

4.1 Choice of Dependent Variable

In the multinomial logit model, the categorical dependent variable Q takes the value 0 if the report is not modified in any way, i.e. a clean report; 1 if the report contains a non going-concern related modification, and 2 if the report contains a going-concern related modification.

In the 'standard' dichotomous logit model estimated for comparative purposes, the categorical dependent variable takes the value 1 if the report contains any modification, and 0 otherwise.

The classification of audit report outcomes is summarised in Table 2.

Table 2
Classification of Audit Report Outcomes

Audit Report	Number of Observations (data described in Section 5)	Classification in Standard Logit Model	Classification in Multinomial Logit Model
Clean	7,125	0	0
'Except for' Disagreement	602	1	1
'Except for' Limitation on Scope	462	1	1
'Severe' Disagreement or Limitation on Scope	222	1	1
Going-concern related modification	431	1	2
'Other' non-qualified modification	462	1	1
Total	9,304		

4.2 Choice of Explanatory Variables

A full list of the explanatory variables included in the models is given in Table 3.

Explanatory variables relating to auditor characteristics are discussed first. Secondly, explanatory variables relating to company characteristics are discussed. Finally, the audit lag and prior year audit report variables are discussed.

Table 3
Explanatory Variables

Variable name	*Description*	*Coefficient expected sign**	
		Non going-concern modification	*Going-concern modification*
ln(ASSE)	the natural log of total assets	?	?
SUBSID	(= 1 if subsidiary company, 0 otherwise)	-	-
QUICK	ratio of current assets excluding stock, to current liabilities	+	-
GEAR	ratio of long-term debt to net worth	?	+
LOSS	(= 1 if company made a loss in the current or prior year, 0 otherwise)	-	+
CONT	contingent liabilities, scaled by total assets	-	+
BIG	(= 1 if auditor is a Big 6 firm, 0 otherwise)	?	?
ln(AF)	the natural log of audit fee	?	?
ln(NAF)	the natural log of non-audit fee	-	-
LAG	number of days between the year end and the filing of accounts	+	+
GC	prior year audit report (= 1 if going-concern modification, 0 otherwise)	+	+
NGC	Prior year audit report (= 1 if non going-concern modification, 0 otherwise)	+	+
DIV	(=1 if the company pays a dividend, 0 otherwise)	?	-
PUBLIC	(=1 if the company is public and non-listed, 0 otherwise)	?	?
LIST	(=1 if the company is listed on a UK stock exchange, 0 otherwise)	?	?

Notes:
Untransformed financial variables are in £000s.
* = relative to the choice of clean audit report

4.3 Variables Associated with Auditor Characteristics

Auditors' ability to detect misstatements is one component of audit quality, which is controlled for in this study by the inclusion of a dummy variable 'BIG' indicating whether the company is audited by a Big 6 audit firm. As discussed in Chapter 1, there exists both theoretical and empirical evidence that large audit firms provide

higher quality audits (for example, DeAngelo, 1981; Balvers et al., 1988; Beatty, 1989; Menon and Williams, 1991; Dye, 1993; Pong and Whittington, 1994; Craswell et al., 1995; Ireland and Lennox, 2002). Large audit firms have incentives to provide higher quality as they have more wealth (Dye, 1993) and reputation (DeAngelo, 1981) at risk. Higher audit quality is expected, ceteris paribus, to increase the likelihood of audit report modification in the absence of selection effects.

However, it is likely that selection effects will be present. High quality auditors are likely to attract high quality clients. Titman and Trueman (1986) and Datar et al. (1991) both present signalling models in which high quality companies prefer more accurate auditors. We cannot observe the audit reports companies would have received from audit firms of the alternative size - we only observe the reports that they did receive from their chose audit firms. If high quality clients are precisely those which are less likely to require audit report modifications, then large (Big 6) audit firms may in fact be associated with a lower likelihood of audit report modifications in the sample. This is most likely to be the case with non going-concern related modifications as these will be reduced by high quality internal controls and high management integrity, under client control, whereas going-concern modifications depend upon the prediction of bankruptcy, an event which is at least partly outside the control of management.

It would be possible to control for the effects of auditor self-selection using a two-stage selection model, as is employed elsewhere in this thesis (Chapters 2 and 4). However, the majority of the companies included in the data are unlisted, so that data important in explaining the auditor choice is not available. Hence this is left for future research.

In addition to litigation/reputation threats, switch threats are also important influences on auditors. Switch threats are expected, ceteris paribus, to reduce the likelihood of audit report modification. As switch threats are likely to be most credible where the auditor stands to lose high audit or non-audit fees, the natural logarithm of both audit and non-audit fees, 'ln(NAF)' and 'ln(AF)', are included as explanatory variables.[27] In the UK, fees for both audit and non-audit services must be disclosed in the financial statements. High *non-audit* fees are expected to reduce audit modifications by impairing auditor independence (increasing the credibility of switch threats). However, high *audit* fees may simply indicate a high audit risk assessment (implying high audit effort) by the auditors rather than compromised independence, so the direction of influence of these fees is unclear.

4.4 Variables Associated with Company Characteristics

Company characteristics such as company type may also influence auditor independence by increasing switch threats, or on the other hand, by increasing litigation and reputation threats. In particular, listed (public) companies are under closer public scrutiny than other companies, which may increase the risk that an auditor will be sued, or that their reputation will suffer, if the auditor fails to issue a modified audit report when required. This would be expected to increase the frequency of modified audit reports as auditors may be more conservative in their reporting (more likely to modify their report on the basis of the same evidence) and may increase the audit work performed (improving the quantity or quality of audit evidence). Alternately, listed (public) companies are likely to have greater financial resources to pay fees, and greater prestige as clients, which may compromise auditor independence by increasing switch threats, and thus reduce the frequency of modified

[27] Prior to performing the log transformation on non-audit fees 'NAF', 1 was added to all observations of the non-audit fees, as in 6,581 observations the reported value is 0, precluding the log transformation.

audit reports. Dummy variables indicating whether a company is public or is listed on a UK stock exchange, are included to control for these effects, which are expected to have similar influences on both audit report modification types.

Other company characteristics are expected to have different influences on different audit modifications. Recall that going-concern related modifications are issued when the auditor feels that there is a significant chance that the company will not continue in operation for the foreseeable future. Hence company characteristics such as *poor* financial health, known to be important in predicting bankruptcy, will also be important in determining going-concern audit modifications. This effect may be compounded as poor financial health may increase the credibility of switch threats by increasing company reliance on receiving clean audit reports. In contrast, non going-concern related modifications are disagreements over the accuracy, accounting treatment or disclosure of items in the financial statements, limitations on scope (lack of audit evidence), and fundamental uncertainties that do not mention going-concern. Companies which incorrectly report *good* financial health will be more likely to receive modifications for disagreement.

4.5 Going-concern related audit modifications

The variables hypothesised to be important for going-concern related audit modifications are those which indicate financial health and therefore bankruptcy risk. Company size is measured by the natural logarithm of the book value of total assets, 'ln(ASSE)', and is expected to be negatively related to going-concern related modifications. Larger companies have greater asset bases on which to secure loans, and greater market power, which may reduce the need for going-concern related modifications by representing good financial health. Size may also increase litigation or reputation threats to auditors as the company will be more visible.

Measures of liquidity and financial risk have been found significant in predicting bankruptcy (e.g., Lennox, 1999; and Hopwood et al., 1989). Liquidity is measured by the ratio of current assets excluding stock to current liabilities, 'QUICK', and a dummy variable 'LOSS' indicating losses in either the current or prior-year. The 'LOSS' variable is included in addition to 'QUICK' because cash flow and accounting profits differ. 'Loss' is a profitability measure and it is expected that companies making losses (with negative profitability) are more likely to receive going-concern audit modifications than companies in profit, because losses may affect future liquidity. Financial risk is measured by the ratio of long-term debt to net worth, 'GEAR'.

Although Dopuch et al. (1987) and Lennox (1999) found high gearing to be significant in influencing audit report modifications, Citron and Taffler (2000), DeFond et al. (2000) and Keasey et al. (1988) do not find gearing ratios to be significant although the signs of the coefficients are positive. Poor liquidity and high gearing are both expected to increase the likelihood of going-concern related audit modifications.

Reported contingent liabilities in the accounts (scaled by total assets, 'CONT'), whether the company pays a dividend in the current year ('DIV'), and company type ('LIST' and 'PUBLIC'), are also expected to influence going-concern modifications. Contingent liabilities may give rise to fundamental uncertainties which affect going-concern. The presence of contingent liabilities is therefore expected to increase the likelihood of a going-concern related modification. Because companies in severe financial distress often do not pay dividends, companies which do pay dividends are expected to be less likely to receive going-concern related audit modifications. Listed (public) companies are also expected to be less likely to receive

going-concern related modifications than other companies, as they have greater access to finance via the financial markets.

4.6 Non going-concern related audit modifications

Recall that the different types of non going-concern related modifications are analysed together due to the limitations of the data source. This complicates the theoretical underpinning of the analysis. Disagreements are expected to be most likely to occur where the financial statements that are presented are overly favourable, or where management integrity or experience is poor. Limitations on scope are expected to be most likely to occur where internal controls and accounting systems are poor. These characteristics are unobservable therefore suitable proxies must be found.

The explanatory variables hypothesised to be important for non going-concern audit modifications are company size ('ln(ASSE)'), the subsidiary indicator dummy variable ('SUBSID'), liquidity ('QUICK' and 'LOSS') and financial risk ('GEAR'), the presence of contingent liabilities ('CONT'), and company type ('LIST' and 'PUBLIC').

The expected sign of the coefficient of company size in non going-concern related modifications is unclear. Larger companies may be more likely to have good accounting systems and internal controls, thus reducing disagreements and limitations on scope, but alternately reported size may reflect overstated asset and understated liability values, increasing the likelihood of disagreements. Larger companies may also be more complex, increasing the likelihood of misstatements in the accounts.

The 'SUBSID' dummy variable is included because subsidiary companies are expected to be less likely to receive going-concern related audit modifications, as they may receive financial support from the parent company or from other group companies. Subsidiary companies are also expected to be less likely to suffer from

problems of limitations on scope as, being part of a group, they may share an accounting function which is therefore larger and likely to be higher quality. Hence, subsidiary companies are expected to be less likely to receive non going-concern related audit modifications.

With respect to non going-concern related modifications, good liquidity is expected to increase disagreement-type modifications as assets and/or profits may be overstated. Although poor quick ratios and losses may be associated with disagreement-type modifications as financially stressed companies may be more likely to attempt to overstate their financial position, this cannot be tested by including variables derived from the reported financial statements. Reported figures will incorporate any misstatements and hence may not reveal the 'true' underlying financial position of the businesses. Understatements of assets and income are less likely to be the result of earnings management attempts than overstatements, therefore they are less likely to be associated with disagreement type audit modifications.

The influence of financial risk ('GEAR') on non going-concern related audit modifications is unclear. High gearing is on one hand expected to decrease the likelihood of non going-concern related modifications, as high gearing may indicate correctly stated values of (low) assets and (high) liabilities, but on the other hand it may increase incentives for earnings management. Managers in highly geared companies are more likely to make income increasing accounting choices, for example to avoid debt covenant violations (Watts and Zimmerman, 1986; Christie, 1990; Holthausen and Leftwich, 1983). Such accounting choices may result in misleading financial statements, thus increasing disagreement type modifications.[28]

[28] Further discussion of earnings management is left to Chapter 4 of this thesis.

The disclosure of material contingent liabilities is expected to reduce non going-concern related audit modifications by reducing disagreements.

Listed (public) companies are expected to be less likely to receive non going-concern related modifications than other companies, as they are likely to have higher quality internal controls and corporate governance, reducing disagreements and limitations on scope. However, as discussed earlier in the chapter, they are also more prestigious clients which may, as already noted, increase both switch threats and litigation/reputation threats.

4.7 The Audit Lag and Prior Year Audit Report

A proxy for the audit lag ('LAG'), and dummy variables representing prior year audit reports ('GC' and 'NGC'), are also included as explanatory variables. These variables are expected to influence all types of audit modification.

The audit lag is normally defined as the length of time between the accounting year end and the date the audit report is signed. Instead, it is proxied in this study by the number of days between the accounting year end and the date the accounts are filed at Companies House ('LAG'), as the actual date that the audit report is signed is not reported in the data. This is reasonable as the audit report is usually signed immediately prior to filing.

Audit lag has been found significant in earlier studies - the longer the lag, the more likely a company is to receive a modified audit report. This has several explanations. Firstly, the length of the lag may capture lengthy negotiations between the auditor and the client over the form of the final accounts and the associated audit report, particularly if they are in disagreement - if the auditors wish to modify their report such negotiations are likely to take longer. Secondly, a long lag may result if the auditors have identified problems and need to perform additional audit work.

Thirdly, a long lag may simply reflect that the company has high inherent and/or control risk and therefore requires more audit work in the first place. Finally, and especially with regard to going-concern, auditors may seek to delay expressing an audit opinion or finalising their report, in the hope that a problem which has been identified will be resolved and a modification can thereby be avoided.

Prior year audit report dummies have been included as there is evidence that audit report types are persistent over time (see e.g. Monroe and Teh, 1993; Krishnan et al., 1996). In other words, companies receiving a modified audit report one year are more likely to receive a modified audit report in the following year than companies receiving a clean report, and vice versa. Keasey et al. (1988), Monroe and Teh (1993) and Citron and Taffler (2000) all include prior audit report variables in their analyses of audit opinions. The dummy 'GC' is equal to 1 if the prior year audit report is a going-concern related modification, and 0 otherwise. The dummy 'NGC' is equal to 1 if the prior year audit report is a non going-concern related modification, and 0 otherwise.

Modified audit reports may persist for several reasons. Firstly, there may simply be continuing, unobserved problems in the companies concerned, although Lennox (1999b) showed that lagged audit reports do not capture unobserved information relating to financial distress, because they do not help to identify failing companies. If continuing problems are causing repeated audit modifications, one would expect persistence to be modification-specific. For example, a going-concern related modification in the current year would be more likely following a prior-year going-concern related modification, but no more likely following a non going-concern related modification.

Alternately, persistent modifications may result from auditor litigation or reputation threats. Auditors may continue to modify their reports on companies in subsequent years even if the problem(s) resulting in the original modification have been resolved, particularly if there is an absence of a credible switch threat from the client companies. If an auditor has modified the audit report once, and the client has not switched to a new auditor, then a switch threat may no longer be credible. If modifications persist because auditors face litigation/reputation threats but not switch threats, then any current-year modification will be more likely following any prior-year modification.

In many cases, persistent clean reports may simply indicate that companies are indeed reporting correctly and face no fundamental uncertainties. However, clean reports may persist even if there is a problem with the financial statements. This may be due to auditor negligence, strong switch threats, or the 'growing problem' effect. The growing problem effect occurs when a problem is identified by an auditor at an early stage, when its (potential) impact on the financial statements is deemed insufficient to warrant a modified report. The problem may become more significant with time, but in subsequent years the auditors may continue to ignore it, either out of embarrassment because it has become apparent that it should have been reported on in an earlier year, or simply because it was allowed to pass without comment on every previous occasion.

Clean audit reports may therefore persist as auditors are reluctant to issue first-time modifications; however, once a modification has been issued further modifications (of any type) may become more likely even if the original problem has been resolved.

The prior year audit report dummy variables have been included in each model to test the significance of persistence in audit reporting. Prior researchers sometimes limit their analysis of audit report modifications to first time modifications (e.g. Dopuch et al., 1987; DeFond et al., 2000), precluding the use of prior year audit report explanatory variables. This is not necessary if the goal is to successfully predict audit modifications using observable data.

5. DATA AND DESCRIPTIVE STATISTICS

The cross-sectional data for the study is taken from OneSource UK Companies Volume One, July 1998.[29] As well as company type (e.g. public limited by share capital, private limited by share capital), OneSource contains historical data taken from published financial statements, accounting ratios, data on company listings, company ownership (i.e. whether a company is a subsidiary), the name of the company's current auditor, the industry in which the company operates, and the audit reports on the financial statements.

Recall that the dependent variable in the multinomial logit estimations takes the value 0 if the current audit report is clean, 1 if the audit report contains a non going-concern audit modification (a 'non-GC' modification), and 2 if the audit report contains a modification related to going-concern (a 'GC' modification).

To reduce data collection costs, and because modified audit reports have a low rate of occurrence, a choice-based sample is used.[30] Estimation of discrete choice models, such as multinomial logit models, can be problematic when there are few

[29] OneSource is a commercially available database of financial information relating to UK companies. The information is held on two CD-ROMs, Volume 1 and Volume 2. Volume 1 holds data on 110,001 UK companies, including all public limited companies and all companies with more than 50 employees, the remainder of the sample comprising the largest UK companies not already included, selected on the basis of turnover, total assets, net worth, or shareholder funds, whichever figure is the highest. Volume 2 holds data on the next 250,000 UK companies, selected on the same basis, with the lowest cut-off value at approximately £38,000.

[30] Dopuch et al. (1987) estimate the probability of a first-time audit modification to be just less than 5%.

observations of a particular outcome; the estimations become overly sensitive to the characteristics of those observations, and different results may be obtained from the use of either logit or probit distributions. A choice-based sampling technique is therefore used to increase the sampling rate of modified companies. To correct for the choice-based sampling, weighted exogenous sample maximum likelihood (WESML) is used to perform the estimations, as in Monroe and Teh (1993). The weights correct for the oversampling of modified companies relative to the population, by attaching less importance to those observations.

OneSource UK Companies Volume One contains data on 77,894 companies with at least two years of accounting data, and audit reports for the most recent (current) year. Of these, 5,229 companies have modified audit reports in the current year and non-missing audit reports in the prior year, and are all included in the initial sample. Modified companies therefore comprise 6.7% of the population (non going-concern related modifications comprise 2.23% and going-concern related modifications comprise 4.49%). However, from the original total of 5,229 modified companies, 2,123 have missing gearing and/or quick ratios, and a further 887 have missing audit fees, resulting in a total of 2,219 modified companies.

Of the 72,665 companies receiving clean audit reports, 49,727 have non-missing audit fees, prior year audit reports and quick and gearing ratios. Of these, 7,267 (one tenth of the total clean companies) were sampled at random, by selecting approximately every seventh company record. These sample weights are taken into account in the subsequent WESML estimations, which are conducted using the survey estimation commands in the software package STATA.[31]

[31] The multinomial logit models are estimated using pseudo-maximum-likelihood methods; the point estimates are obtained from a weighted maximum-likelihood estimator. The final sample of 7,267 clean companies was selected from 72,665 companies, giving a weight of 10 to each clean company observation. Modified company observations had a weight of 1. The models in this chapter were also

Values for contingent liabilities are missing from a further 308 modified and 937 clean companies. As contingent liabilities are disclosed only when necessary, missing values for contingent liabilities are assumed to be zero. Finally, the top 1% assumed outlying gearing and quick ratios are trimmed as follows: 94 outlying observations with reported gearing ratios ('GEAR') greater than 56.3086, and a further 88 observations with reported quick ratios ('QUICK') greater than 12.206.[32] These observations are assumed outlying as their values seem unrealistically high, and may possibly indicate errors in the data.

The final sample consists of 9,304 companies of which 7,125 received a clean report on the current financial statements, 431 received going-concern related modifications, and 1,748 received non going-concern related modifications. 8,289 companies are private, and 1,015 companies are public, of which 374 (4% of the total) are listed. This sample is then divided at random into the estimation sample and the holdout sample, by selecting every fourth observation of each modification and company type (public/private) into the holdout sample. The composition of the final estimation and holdout samples are summarised in Table 4.

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re-estimated using weights of 6.84 for clean companies (the sample of clean companies was taken from the sub-population of 49,727 clean companies with non-missing audit fees, prior-year audit opinions, quick and gearing ratios) and 1 for modified companies; the results were qualitatively identical and are not reported here.

[32] An alternative to the logarithmic transformations of skewed variables (total assets 'ASSE', audit fees 'AF', and non-audit fees 'NAF') and sample trimming of observations with outlying quick and gearing ratios performed here, would be to perform rank transformations. Rank transformations have been shown to result in residuals which conform more closely to OLS assumptions (Kane and Meade, 1998), being normally distributed, spherical, and uncorrelated with explanatory variables. Normality is especially important for the second-stage regression equations in a selection model (Maddala, 1983) such as employed elsewhere in this thesis (Chapters 2 and 4). However, the models estimated in this chapter are multinomial and dichotomous logit models, the maximum likelihood estimators of which remain consistent despite non-normality (Maddala, 1983). Nevertheless, sample trimming and log transformations have been used in this chapter. Sample trimming was employed here as the observations deleted appeared to have unrealistically high values of the quick and gearing ratios. Log transformations were used to retain consistency with prior studies of audit reporting. In particular, Monroe and Teh (1993), Dopuch et al. (1987), DeFond et al. (2000), and Krishnan (1994) all peform log transformations of total assets.

Table 4
Final Estimation and Holdout Sample

	Private companies	*Public companies*	*Total*
Panel A: Estimation Sample			
Observations	6,218	760	6,978
'Except for' disagreement	430	22	452
'Except for' limitation on scope	326	20	346
'Severe'	158	9	167
Other non-GC modification	300	46	346
Total non-GC modifications	1,214	97	1,311
GC modifications	291	32	323
Total modified	1,505	129	1,634
Panel B: Holdout Sample			
Observations	2,071	255	2,326
'Except for' disagreement	143	7	150
'Except for' limitation on scope	109	7	116
'Severe'	52	3	55
Other non-GC modification	100	16	116
Total non-GC modifications	404	33	437
GC modifications	97	11	108
Total modified	501	44	545

Notes:
A 'GC' modification is one which relates to going-concern.

Table 4 shows there are many more private companies than public companies in the sample. In the sample, 24% of private companies, and 17% of public companies receive modified audit reports. This is a significant difference, as measured by a two-sample *t*-test. However, this difference only applies for non going-concern related modifications, as the proportions of public and private companies receiving going-concern related modifications (4.2% and 4.7% respectively) are not significantly different.

Descriptive statistics for the explanatory variables defined in Table 3 are reported in Table 5 for the estimation sample. Of particular interest is the distribution of large (Big 6) audit firms between different company types. Public companies are significantly more likely to hire Big 6 audit firms than private companies, as measured by a two-sample *t*-test of the mean.

Table 5
Estimation Sample Descriptive Statistics

	Private companies		*Public companies*	
Variable	*Mean*	*Median*	*Mean*	*Median*
ln(ASSE)	8.130	7.900	9.604	9.284
SUBSID	0.489	-	0.247	-
QUICK	1.094	0.900	1.232	0.930
GEAR	1.265	0.130	1.362	0.270
LOSS	0.180	-	0.191	-
CONT	0.272	0.000	0.021	0.000
BIG	0.363	-	0.522	-
ln(AF)	2.136	2.079	3.105	2.833
ln(NAF)	0.620	0.000	2.052	1.609
LAG	244.930	243.000	191.882	181.000
GC	0.033	-	0.032	-
NGC	0.150	-	0.076	-
DIV	0.3522	-	0.570	-
LIST	n/a	N/a	0.379	-

Notes:
Variables are defined in Table 3

From Table 5 it can also be seen that public companies are generally larger and pay generally higher fees, are more likely to pay dividends, and have on average higher gearing and liquidity.

The pattern of persistence in audit reporting in the data is revealed by the bunching of observations along the leading diagonals in Table 6. Although it is clear there is strong persistence within particular types of audit modification, some companies that receive modified audit reports related to going concern also subsequently receive non going-concern modifications, and vice versa. 41 companies in the estimation sample receive non going-concern related audit modifications following a going-concern related modification, and 11 companies in the holdout sample. 36 companies in the estimation sample receive going-concern related audit modifications following a non going-concern related audit modification, and 10 companies in the holdout sample.

Table 6
Persistence in Audit Reporting

Current Year Audit Report	Prior Year Audit Report Clean	Non-GC	GC	Total
Estimation sample				
Clean	5,264	51	29	5,344
non-GC modification	366	904	41	1,311
GC modification	128	36	159	323
Total	5,758	991	229	6,978
Holdout Sample				
Clean	1,754	16	11	1,781
non-GC modification	120	306	11	437
GC modification	48	10	50	108
Total	1,922	332	72	2,326

There are 366 first time modifications which are non going-concern related, and 128 which are going-concern related, in the estimation sample. In the holdout sample, there are 120 non going-concern related, and 48 going-concern related, first time modifications.

Persistence in audit modifications appears to be less strong for going-concern related modifications than it is for non going-concern related modifications. This is possibly because some going-concern difficulties will be 'resolved' by bankruptcy, resulting in sample attrition, or by companies trading out of their difficulties (Monroe and Teh, 1993).

6. ESTIMATION RESULTS

The model is estimated twice. The first estimation is a 'standard' dichotomous logit model with binar dependent variable equal to 1 if the audit report is modified in any way, and 0 otherwise. The second estimation is a multinomial logit model with dependent variable equal to 1 if the audit report contains a non going-concern related audit modification, 2 if it contains a going-concern related audit modification, and 0 otherwise.

The explanatory variables included in the models are identical, and described in Table 3. Note that time subscripts for the financial statements to which the variables relate have not been included as all variables relate to the most recent set of accounts, except for the variables describing prior year audit reports, and the LOSS dummy which relates to both the current and prior year.

The results of the estimation of both the 'standard' dichotomous and multinomial logit models of audit reporting, on the estimation sample, are reported in Table 7. It is clear that the significant determinants of audit modifications differ across modification types, with the exception of the audit lag ('LAG') and the prior year audit report dummy variables ('GC' and 'NGC'), which positively increase the likelihood of both modification types.

Large companies are more likely to receive non going-concern related modifications than other companies, and less likely to receive non going-concern related modifications than other companies. This is consistent both with overstated assets increasing the chance of disagreement-type modifications, and reduced financial risk reducing the likelihood of bankruptcy.

Subsidiary companies are significantly less likely to receive non going-concern related audit modifications than other companies, as expected. However, whether a company is public but non-listed ('PUBLIC'), or listed ('LIST'), does not significantly affect the likelihood of either modification type.

Table 7
Estimation Results

	Panel A: Logit Model		Panel B: Multinomial Logit Model		
Variable	*Any Modification*		*Non-GC modification*		*GC modification*	
ln(ASSE)	0.101	*	0.153	**	-0.180	*
	(0.048)		(0.053)		(0.076)	
SUBSID	-0.299	*	-0.303	*	-0.186	
	(0.139)		(0.149)		(0.216)	
QUICK	-0.057		0.045		-1.135	**
	(0.057)		(0.054)		(0.223)	
GEAR	0.019		0.017		0.023	*
	(0.010)		(0.011)		(0.012)	
LOSS	0.158		-0.070		0.830	**
	(0.183)		(0.207)		(0.208)	
CONT	0.018	*	-0.005		0.072	**
	(0.008)		(0.015)		(0.015)	
BIG	-0.227		-0.439	**	0.429	
	(0.144)		(0.160)		(0.224)	
ln(AF)	-0.063		-0.112		0.230	
	(0.081)		(0.092)		(0.128)	
ln(NAF)	-0.049		-0.045		0.011	
	(0.065)		(0.071)		(0.086)	
LAG	0.002	**	0.002	**	0.003	**
	(0.001)		(0.001)		(0.001)	
GC	4.225	**	3.046	**	5.054	**
	(0.225)		(0.270)		(0.255)	
NGC	5.190	**	5.468	**	3.042	**
	(0.157)		(0.157)		(0.264)	
DIV	-0.186		-0.112		-0.560	**
	(0.127)		(0.141)		(0.208)	
PUBLIC	0.243		0.153		0.426	
	(0.219)		(0.252)		(0.258)	
LIST	-0.419		-0.469		-0.564	
	(0.410)		(0.411)		(0.635)	
Constant	-5.604	**	-6.140	**	-5.067	**
	(0.411)		(0.447)		(0.629)	
Observations	6,978		6,978			
Pseudo R^2	0.457		0.456			
	$F(15, 6963) = 98.02$ **		$F(30, 6,948) = 67.38$ **			

Notes:
* = statistically significant at the 5% level.
** = statistically significant at the 1% level.
Standard errors are reported in (parentheses).
Coefficients are relative to the base choice of clean report.
Dependent variable is audit report type. Explanatory variables are defined in Table 3.
A 'GC' modification is one which relates to going-concern.

Companies choosing Big 6 audit firms are significantly less likely to receive non going-concern modifications than other private companies, but this should not be taken to suggest that Big 6 audit firms are lower quality than other audit firms.

In practice, it is often company management that chooses the auditors (rather than the shareholders, who may merely 'rubber stamp' management's decision). Auditors have therefore not been randomly assigned to companies, but chosen by them. This may result in a self-selection bias. Companies choosing Big 6 audit firms may share other unobserved characteristics that reduce the likelihood of such modifications (for example, management integrity). Companies choosing large audit firms may therefore be precisely those that are less likely to require audit modifications.

As expected, companies with high financial risk ('GEAR'), poor liquidity ('QUICK' and 'LOSS'), that report material contingent liabilities ('CONT') or which do not pay dividends ('DIV'), are more likely to receive going-concern modifications than other companies. Audit and non-audit fees ('ln(AF)' and 'ln(NAF)') do not significantly affect audit modifications.

Of most interest when comparing the results of the standard logit estimation (Panel A of Table 7) with those of the multinomial estimation (Panel B of Table 7), are the significant coefficients on company size ('ln(ASSE)'). These are positive for non going-concern related modifications (perhaps due to overstatements of assets), but negative for going-concern related modifications (large companies are less likely to become bankrupt). This suggests that the multinomial logit model may outperform the standard logit model in correctly predicting modified audit reports. However, the coefficients on the lagged audit report dummy variables ('GC' and 'NGC') are many times larger in magnitude than those on company size, or indeed any other explanatory variable, suggesting that there may be little improvement possible over a naïve model of audit report prediction, such as to predict the current year audit report to be equal to the prior year audit report.

6.1 Testing the IIA Condition

Recall that the IIA condition must hold for the multinomial logit analysis to be valid. For the IIA condition to hold, the ratio of the probability of choosing a going-concern related modification in the current year, to that of choosing a clean audit report, should be independent of the non going-concern related modification choice. Hausman and McFadden (1984) suggest that if a subset of the choice set truly is irrelevant, omitting it from the model altogether will not change parameter estimates systematically. This is the basis for a Hausman specification test to see whether the IIA conditions does not hold. The null hypothesis is that the parameter estimates do not change systematically when one choice subset (and the observations with those outcomes) is eliminated from the model.

The statistic is distributed as χ^2 with, for this model, 15 degrees of freedom. The software package STATA computes a χ^2 value of 0.52, and therefore the null hypothesis cannot be rejected. Therefore there is no evidence that the IIA condition does not hold.

This may seem counter-intuitive given that prior year audit report modifications of one type are significant in determining current year modifications of the other type. In the multinomial logit model, prior year going-concern related modifications are not only important for current year going-concern modifications, but are also important for current year *non* going-concern related modifications. Similarly, prior year non going-concern related modifications are important for both current year non going-concern modifications, and current year going-concern related modifications. However, what is important for the IIA condition is that the current year choices are independent of each other. It does not matter that some explanatory

variables are important for both choices, even if those variables relate to choices made in the prior year.

The predictive power of the multinomial logit model is now compared to both the standard logit model, and a naïve prediction model of this type, in Section 7.

7. PREDICTIVE POWER

The coefficient estimates from the multinomial model (reported in Table 7) are now used to predict audit report types for the holdout sample. Table 8 summarises the predicted probabilities of audit report modifications. Panel A reports predicted probabilities for the estimation sample, and Panel B reports predicted probabilities for the holdout sample.

The predicted probabilities of non going-concern related modifications are on average significantly greater for companies actually receiving audit report modifications than for those receiving clean audit reports. This is especially true for companies actually receiving non going-concern related modifications. For these companies in the estimation sample, the mean predicted probability is 0.443 and the median is 0.590, compared to 0.111 and 0.048 for companies receiving going-concern related modifications, and 0.013 and 0.006 for companies receiving clean audit reports. For companies in the holdout sample, the mean predicted probability of receiving a non going-concern related modification is 0.454 and the median is 0.604, compared to 0.098 and 0.033 for companies receiving going-concern related modifications, and 0.013 and 0.006 for companies receiving clean audit reports.

Table 8

Estimated Probabilities of Audit Report Modifications from Multinomial Logit Model

	Actual Audit Report		
	Clean	Non-GC modification	GC modification
Panel A: Estimation Sample			
Probability of Non-GC Modification			
Estimated Probability: Mean	0.013	0.443	0.111
Median	0.006	0.590	0.048
Std. Dev.	0.059	0.295	0.190
t-Statistic		98.848	23.454
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		967.455	143.487
P-Value (one-tailed)		0.000	0.000
Number	5,344	1,311	323
Minimum	0.001	0.002	0.000
Maximum	0.808	0.866	0.847
Probability of GC Modification			
Estimated Probability: Mean	0.004	0.028	0.208
Median	0.002	0.011	0.075
Std. Dev.	0.023	0.075	0.238
t-Statistic		19.920	58.275
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		665.785	278.125
P-Value (one-tailed)		0.000	0.000
Number	5,344	1,311	323
Minimum	0.000	0.000	0.000
Maximum	0.695	0.878	1.000
Panel B: Holdout Sample			
Probability of Non-GC Modification			
Estimated Probability: Mean	0.013	0.454	0.098
Median	0.006	0.604	0.033
Std. Dev.	0.056	0.296	0.173
t-Statistic		58.914	12.712
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		304.728	24.608
P-Value (one-tailed)		0.000	0.000
Number	1,781	437	108
Minimum	0.001	0.003	0.000
Maximum	0.764	0.840	0.737
Probability of GC Modification			
Estimated Probability: Mean	0.004	0.024	0.200
Median	0.002	0.010	0.047
Std. Dev.	0.022	0.061	0.243
t-Statistic		11.196	31.873
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		218.663	66.126
P-Value (one-tailed)		0.000	0.000
Number	1,781	437	108
Minimum	0.000	0.000	0.000
Maximum	0.394	0.630	1.000

Notes:

A 'GC' modification is one which relates to going-concern.

t- (χ^2-) statistics test differences between means (medians) of modified and clean report samples.

The predicted probabilities of going-concern related modifications are also on average significantly greater for companies actually receiving audit report modifications than for those receiving clean audit reports. In particular, for companies actually receiving going-concern related modifications in the estimation sample, the mean predicted probability is 0.208 and the median is 0.075, compared to 0.028 and 0.011 for companies receiving non going-concern related modifications, and 0.004 and 0.002 for companies receiving clean audit reports. For companies in the holdout sample, the mean predicted probability of receiving a going-concern related modification is 0.200 and the median is 0.047, compared to 0.024 and 0.010 for companies receiving non going-concern related modifications, and 0.004 and 0.002 for companies receiving clean audit reports.

The predicted probabilities can be used to predict audit report outcomes in the holdout sample. The simplest method of doing this is to assign the outcome with the highest predicted probability as the predicted outcome.

A summary of outcomes predicted in this way from the multinomial logit model, versus actual outcomes, is reported in Panel A of Table 9 for companies in the estimation sample, and in the holdout sample.

Panel A in Table 9 shows that in both the estimation and the holdout sample, using the simple prediction rule based on the predicted probabilities of the different audit report outcomes can result in considerable misspecification of the outcomes, particularly in going-concern audit modifications. For example, we can see that only 52 of the 323 companies in the estimation sample that receive going-concern related modifications are successfully predicted, and only 20 of the 108 companies in the holdout sample.

The predictive power of the model can be improved by using cut-off probabilities, as in Dopuch et al. (1987) and Monroe and Teh (1993). A company is now predicted to receive a certain type of modified audit report if the predicted probability of its receiving that audit report type is greater than both some specified cut-off probability, and the probability of its receiving the alternative type of modified audit report. Otherwise, the company is predicted to receive a clean audit report.

Panel B in Table 9 reports the percentages of audit report types correctly predicted, for a range of different cut-off probabilities. Reducing the cut-off probability increases the percentage of modified audit reports that are correctly predicted for both the estimation and holdout samples, but reduces that of clean audit reports.

This is acceptable only if the cost of failing to correctly predict an audit modification (a Type I error) sufficiently exceeds that of failing to correctly predict a clean audit report (a Type II error). Panel B in Table 9 reports Type I and Type II error rates for the same range of cut-off probabilities. Note that Type I and Type II errors do not distinguish between different types of audit modification, so that a Type I error corresponds to predicting that a modified audit report is clean, and a Type II error corresponds to predicting that a clean audit report is modified, regardless of the type of modification. In other words, predicting that a company receives a going-concern related modification when it actually receives a non going-concern related modification, does not constitute an error. Type I errors decrease as the cut-off probability is reduced; Type II errors increase.

Table 9
Predictive Power of Multinomial Logit Model

Panel A	Predicted Audit Report			
Actual Audit Report	Clean	Non-GC	GC	Total
Estimation sample				
Clean	5,295	46	3	5,344
non-GC modification	438	860	13	1,311
GC modification	237	34	52	323
Total	5,970	940	68	6,978
Holdout Sample				
Clean	1,765	16	0	1,781
non-GC modification	139	296	2	437
GC modification	78	10	20	108
Total	1,982	322	22	2,326

Panel B	% Correctly Classified				Type I	Type II
Cut-Off Probability	clean	Non-GC	GC	overall	error rate	error rate
Estimation sample						
0.2	98.7	70.0	42.4	90.5	0.317	0.013
0.1	98.6	69.0	47.4	90.6	0.305	0.014
0.05	98.4	69.0	48.0	90.6	0.302	0.016
0.025	98.2	69.0	49.2	90.5	0.298	0.018
0.01	86.4	75.4	55.1	82.9	0.211	0.136
Holdout sample						
0.2	98.7	70.0	40.7	90.6	0.321	0.013
0.1	98.5	70.3	44.4	90.7	0.310	0.015
0.05	98.4	70.3	44.4	90.6	0.308	0.016
0.025	98.1	70.5	45.4	90.5	0.303	0.019
0.01	86.7	75.7	53.7	83.1	0.226	0.133

Panel C	% Correctly Classified				Type I	Type II
Naïve Prediction Rule	clean	Non-GC	GC	overall	error rate	error rate
Estimation sample	98.5	69.0	49.2	90.7	0.302	0.015
Holdout sample	98.5	70.0	46.3	90.7	0.308	0.015

Notes:
Panel A reports predicted audit report outcomes equal to the audit report outcome with highest predicted probability.
Panel B reports error rates, and the percentage of audit report outcomes correctly predicted in the estimation sample, where the predicted outcome is a non-GC (GC) modification if the predicted probability of a non-GC (GC) modification exceeds both the cut-off probability and the predicted probability of a GC (non-GC) modification, and is a clean report otherwise. A Type I error is defined as classifying a modified audit report as clean, and a Type II error is defined as classifying a clean audit report as modified.
Panel C reports comparative figures to Panel B, based on the alternative naive prediction rule 'predicted audit report outcome is equal to prior year audit report'.

The predictive power of the multinomial logit model may be usefully compared to both a naïve prediction rule, and to that of a standard dichotomous logit model. The naïve alternative rule is to predict that all companies receive the same audit report as in the prior year.

Comparative figures for the naïve prediction rule are reported in Panel C of Table 9. With a cut-off probability of 0.01, the multinomial model correctly predicts substantially more audit modifications in both the estimation and holdout samples. However, the multinomial model correctly predicts fewer clean audit reports.

The model's predictive power may additionally be compared to the predictions obtained from the estimated coefficients of the standard dichotomous logit model (reported in Column 1 of Table 7). Recall that the 'standard' logit model contains the same explanatory variables as the multinomial logit model, and is estimated over the same sample, but the dependent variable is coded simply 0 for a clean audit report, and 1 for any modification.

Before doing this, it is necessary to determine the basis on which the models are to be compared. Following Dopuch et al. (1987) and Monroe and Teh (1993), I compute the cost of prediction errors from the model, relative to the cost of errors from the naïve alternative strategy and to those from the standard logit model. The relative costs for the holdout sample are reported in Table 10, for a range of relative costs of Type I and Type II errors. Prediction error costs are calculated as $\alpha\times$(Type I error rate)$\times$(Relative Type I error cost) + $(1 - \alpha)\times$(Type II error rate)$\times 1$ where α is the proportion of modified audit reports in the population, 0.067. In line with Dopuch et al. and Monroe and Teh, Type I errors are believed to be more costly than Type II errors, as for example auditors face lawsuits only for failing to issue audit report

modifications, not for issuing unnecessary modifications. Relative error costs are the ratio of the error costs for the multinomial logit model to those for the alternatives.

For each level of relative Type I and Type II error costs, the cut-off probability is chosen so as to minimise error costs in the estimation sample. Columns 5 and 6 of Table 10 report the relative misclassification (prediction error) costs of the multinomial logit model compared to the naïve model and the standard logit model, respectively. Type I and Type II error rates and relative misclassification costs are reported for each cut-off probability, for the holdout sample only.

For sufficiently high relative error costs, the multinomial model of audit reporting results in lower misclassification costs than either the naïve strategy, or the standard logit model. However, the improvements are marginal. Even at the high relative cost of Type I to Type II errors of 20:1 and the corresponding cut-off probability of 0.0118, the misclassification costs generated by the multinomial model are 95.7% of those generated by the naïve model and 94.9% of those generated by the standard logit model. Furthermore, at the relative cost of 5:1, and corresponding cut-off probability of 0.0536, the multinomial model performs worse than both the dichotomous logit model and the naïve prediction rule.

Table 10
Misclassification Costs and Errors in the Holdout Sample

Relative Costs of Type I and Type II Errors	Cut-Off Probability which Minimises Model Error Costs in Estimation Sample	Type I Error Rate in Holdout Sample	Type II Error Rate in Holdout Sample	Cost of Model Errors Relative to Cost of Errors from Naïve Prediction Rule*	Cost of Model Errors Relative to Cost of Errors from Dichotomous Logit Model**
1:1	0.3145	0.351	0.011	0.965	0.973
5:1	0.0536	0.308	0.016	1.011	1.008
10:1	0.0263	0.303	0.018	0.997	0.968
15:1	0.0179	0.288	0.030	0.982	0.984
20:1	0.0118	0.253	0.074	0.957	0.949

Notes:
* = the alternative naïve prediction rule is to predict audit reports equal to the prior year audit report. Error rates are reported in Table 9.
** = error rates, using the coefficients from a dichotomous logit model of audit reporting estimated over the estimation sample to predict modified audit reports in the holdout sample, are as follows:

Relative Cost of Errors	Cut-Off Probability	Type I Error Rate	Type II Error Rate
1:1	0.3145	0.325	0.014
5:1	0.0536	0.308	0.015
10:1	0.0263	0.297	0.030
15:1	0.0179	0.277	0.048
20:1	0.0118	0.189	0.190

A Type I error is defined as classifying a modified audit report as clean, and a Type II error is defined as classifying a clean audit report as modified. Different modification types are not distinguished for the purposes of Type I and II errors.
Error costs are calculated assuming the proportion of modified audit reports α in the population is 0.067. Error costs are $\alpha\times$(Type I error rate)$\times$(Relative Type I error cost) + $(1 - \alpha)\times$(Type II error rate)$\times 1$.
Relative error costs are the ratio of the error costs for the multinomial logit model to those for the alternative prediction methods.

8. CONCLUDING REMARKS

8.1 Summary of Results

This chapter provides evidence that a multinomial logit model using publicly observable characteristics can be used to predict whether an auditor will issue a going-concern related or non going-concern related modified audit report, in the current year, for UK companies. In most cases error costs generated by the model are lower than those generated by either a standard dichotomous logit model or a naïve prediction strategy, when the relative cost of Type I errors to Type II errors is taken into consideration. However, the improvement is very marginal. This suggests that a multinomial model of audit reporting may not be cost beneficial to these alternatives when predicting modified audit reports *per se*.

The estimation results reveal the determinants of audit reports in the UK. Prior studies of audit reporting in the UK focus on either very small, private companies and the 'small company' audit qualification (Keasey et al., 1988) or going-concern audit modifications on large, listed companies (e.g. Lennox, 1999a; Citron and Taffler, 1992 and 2000). However, the 'small company' audit qualification examined by Keasey et al. is no longer relevant in the UK as eligible companies are now able to claim exemptions from audit. Furthermore, audit modifications may be issued for a range of reasons, in addition to going-concern issues, and on a range of companies from privately owned to listed. In contrast to these prior studies, this chapter analyses both going-concern and non going-concern related audit modifications, over a wide range of private and public (listed and non-listed) UK companies.

Most prior studies outside the UK analyse only going-concern or general uncertainty modifications (e.g. Dopuch et al., 1987; Bell and Tabor, 1991; Monroe

and Teh, 1993). Therefore there is a general lack of investigation of audit modifications related to disagreements or limitations on scope. This chapter contributes to the literature by showing, in a multivariate analysis, that large companies and companies receiving prior year audit modifications (of any kind), are more likely to receive such modifications. It also shows that subsidiary companies, and companies hiring large audit firms, are less likely to receive such modifications.

The determinants of going-concern and non going-concern related audit modifications differ. This chapter shows that large companies, those with good liquidity, and those paying dividends, are less likely to receive going-concern modifications, whereas those with high gearing, contingent liabilities, making recent losses, and receiving prior year audit modifications (of any kind), are more likely to receive such modifications. Thus, company size has opposite effects on going-concern and non going-concern modifications, whereas subsidiary status is only important for non going-concern reports, and liquidity, losses, contingent liabilities and dividends are only important for going-concern reporting. As the determinants of modified audit reports differ, care should be taken when predicting or analysing audit reports, to distinguish between different forms of audit modifications.

By analysing both public and private companies, it was possible to test whether public or listed company status affected audit report outcomes. In univariate tests, public companies were significantly less likely to receive non going-concern related audit modifications than private companies. However, in multivariate tests, no evidence was found that stock exchange listing or public status influenced audit reporting in any way. In contrast, subsidiary companies were found to be significantly less likely to receive non going-concern related audit modifications than independent companies.

The significant negative coefficient on the audit firm size dummy for non going-concern modifications should not be assumed to imply that large audit firms are lower quality in respect of detecting such problems. The negative coefficient may be due to selection bias, as high quality companies (less likely to require modifications for disagreements and/or limitations on scope) are more likely to hire large audit firms. Further research is required to control for the determinants of auditor choice in non-listed companies. This research would entail estimating a selection model, similar to those featured in Chapters 2 and 4 of this thesis.

In addition to these findings, by including audit and non-audit fees as explanatory variables and controlling for observable characteristics, no evidence is provided that high audit or non-audit fees compromise auditor independence by reducing the likelihood of audit modifications.

8.2 Limitations of Analysis

The results of the analysis reported in this chapter must be viewed in the light of several important limitations of the data set.

Firstly, I have assumed that multiple modifications which include matters relating to going-concern have been classified as going-concern related. If this is not so, then some of the observations classified as non going-concern related may share poor financial health characteristics with those classified as going-concern related. Including these observations may result in biased parameter estimates.

Secondly, the class of non going-concern related audit modifications includes disparate modification types. This class includes qualifications for both disagreements and limitations on scope, and I have also included audit report modifications regarding uncertainties which don't relate to going-concern. Separating these modification choices in such a way as to preserve IIA would provide additional

information for users of the model, and may improve the analysis of the determinants of such reports.

CHAPTER 4

ARE LARGE AUDITORS MORE CONSERVATIVE? EARNINGS MANAGEMENT AND AUDITOR CHOICE IN THE UK

1. INTRODUCTION

In Chapter 1 I outline prior research that suggests large audit firms provide higher quality audits (in particular, see Sections 2.6 and 3 of Chapter 1). To summarise, theoretical studies (e.g. Dye, 1993; DeAngelo, 1981b) predict that large audit firms will provide higher quality because they have more wealth or reputation at risk from litigation. Supporting empirical evidence includes the audit fee studies showing the existence of large audit firm fee premiums which are discussed in Chapter 2 (e.g. Pong and Whittington, 1994; Craswell et al., 1995). Other empirical studies are discussed in Chapter 1. These examine the impact of auditor reputation on initial public offerings (Menon and Williams, 1991; Balvers et al., 1988), and auditor accuracy in bankruptcy or litigation prediction (e.g. Lennox, 1999a; Raghunandan, 1993). I also describe studies which find that hiring large auditors significantly increases the likelihood of audit modifications (e.g. DeFond et al., 2000; Keasey et al., 1988), although the evidence presented in Chapter 3 does not support this (possibly due to selectivity bias). Finally, the earnings management literature suggests that large audit firms may constrain their clients' discretionary accounting choices. Extending this literature, in this chapter I test whether the clients of large auditors are more conservative in their financial reporting than those of small

auditors. As auditors are not randomly assigned to clients, I control for the auditor choice, as in Chapter 2.

Academic attempts to measure audit report accuracy can compare reports concerning going-concern uncertainties and the subsequent incidence of bankruptcies (e.g. Lennox, 1999a), or litigation uncertainties and the subsequent incidence of litigation (Raghunandan, 1993). But it is usually impossible to observe whether a clean audit report should have been modified, or vice versa. Unless we conduct our own audit, we cannot observe the accuracy of the accounting numbers reported, nor the appropriateness of estimates or accounting treatments, in order to determine whether disagreement qualifications are required. It is similarly impossible to observe the evidence available to the auditors, to determine whether limitation on scope qualifications are required.[33] Therefore, comparisons of the accuracy of reports from large auditors with those of small auditors are not possible in these respects. However, there is more scope for comparisons of conservatism in financial or audit reporting.

Both conservatism and accuracy have been used to represent audit quality in the audit reporting literature. For example, Palmrose (1988) defines audit quality in a manner consistent with conservatism in the Francis and Krishnan (1999) audit reporting sense (see below), whereas Balachandran and Nagarajan (1987) and Nelson et al. (1988) consider audit quality in a manner consistent with accuracy.

Francis and Krishnan (1999) compare audit report modifications issued by large and small auditors. They find that large auditors are more conservative in the

[33] Recall that the audit report expresses an opinion on the truth and fairness of the financial statements, and whether they have been properly prepared. Qualified opinions in the UK may relate to either disagreements (over accuracy, accounting choice or disclosure) or to limitations on scope (lack of access to audit evidence). Audit reports may also contain explanatory paragraphs detailing fundamental uncertainties in the accounts, particularly with respect to going concern. Modified audit reports are those that contain explanatory paragraphs or qualified audit opinions. All other audit reports are clean.

sense that they are more likely to issue modifications, when reporting on companies with high values of income-increasing accounting accruals. Similarly, DeFond et al. (2000) and Keasey et al. (1988) find that large auditors are more likely to issue audit report modifications. In this sense, a conservative auditor may not be an accurate auditor, as she may issue unwarranted audit modifications.

This chapter uses a different concept of auditor conservatism. Under this definition, a more conservative auditor is one who requires more conservative financial statement content. To be precise, I define a conservative auditor as one whose clients' financial statements do not contain high levels of abnormal income-increasing (positive) accounting accruals. I motivate this below.

Because this chapter examines auditor conservatism in relation to the content of their clients' published financial statements, I take account of the influence of the audit on the behaviour of management. This is suggested by Hatherly, Nadeau and Thomas (1996). Auditors may influence the content of financial statements either by influencing management's pre-audit reporting, or through audit adjustments.[34] It is a more subtle definition of conservatism than that of Francis and Krishnan (1999). However, it is related to the Francis and Krishnan study by the work of Bartov et al. (2001), which shows a positive association between discretionary accruals (DA) and audit report qualifications.

Francis and Krishnan (1999) investigate audit reporting on high-accrual companies because such companies are more likely to be engaging in earnings

[34] Audit adjustments for discovered misstatements are non-trivial (Kinney and Martin, 1994), and represent a less costly means for auditors to reduce their exposure than issuing audit modifications (because companies are more likely to switch auditors following a modification – see, for example, Chow and Rice, 1982; Craswell, 1988; and Citron and Taffler, 1992). Companies may be prepared to accept audit adjustments to avoid audit modifications, as there is some evidence to suggest the market reacts unfavourably to modified audit opinions (e.g. Chen et al., 2000; Choi and Jeter, 1992; and Dopuch et al., 1986), although other studies report no significant market reactions (Chow and Rice, 1982; Dodd et al., 1984).

management. Managers have incentives to manipulate earnings to maximise firm and/or personal wealth (for example, managers may receive performance bonuses and shares or share options as compensation). Deliberate manipulations of earnings, or 'earnings management', is receiving considerable public attention in the UK at present. In June 2001, the Auditing Practices Board issued a consultation paper *Aggressive Earnings Management* that alerts users and preparers of financial statements to the 'potential threat' that opportunistic earnings management presents. Less than a month later, the Accounting Standards Board issued a related discussion paper on revenue recognition, one of the areas which may commonly be manipulated to achieve earnings management.

Earnings management is of concern to auditors as they may face litigation or reputation losses if they fail to identify or correct resulting misstatements in the accounts. Because large auditors have more wealth and reputation at risk, they are expected to be more concerned over financial statement content. However, the direction of misstatement is important as auditors have asymmetric loss functions (Antle and Nalebuff, 1991). St. Pierre and Anderson (1984) provide evidence that auditors are routinely sued for failing to modify their reports when earnings management by clients overstates earnings. Understatements of earnings do not have the same effect. Kinney and Martin (1994) conclude that auditing reduces positive bias in financial statements. Auditors are expected to be more concerned with overstatements than understatements, so auditor conservatism is a more appropriate quality concept to test than auditor accuracy.

In focusing on signed accruals and not absolute accruals, my definition reflects that auditors prefer understatements to overstatements. This is related to Basu's (1997) interpretation of conservatism, which captures accountants' tendency to

require a higher degree of verification for recognising good news than bad news (prudence), so that earnings reflect bad news more quickly than good news.

I define opportunistic earnings management as that which is undertaken for managers' personal benefit. Although opportunistic earnings management seems more likely to result in overstatements, Perry and Williams (1994) find evidence that management understates earnings in the year preceding the public announcement of their intention to initiate a management buyout, presumably in the hope of reducing the share price. I expect high quality auditors to constrain opportunistic earnings management, but I do not expect them to constrain understatements of income or assets to the same degree as overstatements.

It is also possible that other incentives for earnings management, such as attempts to influence external parties, may result in understatements. For example, Guenther et al. (1997) find that there is an increase in income deferrals, reducing earnings, when firms face additional incentives to report low income to tax authorities. Nelson et al. (2000) find that 60% of earnings management attempts by managers are income-increasing; therefore 40% must be income-decreasing. I do not expect auditors to constrain understatements as much as overstatements in any of these situations.

Because manipulations of earnings may occur for reasons other than opportunism on the part of self-interested management, auditors may react differently according to (their assessment of) managerial motivation. However, these motives are hard to distinguish. For example, an opportunistic motive for earnings management would exist where managerial compensation is linked to company performance. Managers may receive bonuses according to profitability, or hold shares (or share options) in the firm they manage. They may therefore wish to choose

accounting methods which increase profits and/or the company share price to improve their compensation. But Fields et al. (2001) review the literature on the determinants and consequences of accounting choice, and note that the same accounting choices may be motivated by managers' objective assessment that the current share price is undervalued relative to their private information. Thus management may use earnings management techniques as a signal to less well-informed investors.

In fact, Fields et al. (2001) specify three categories of goals or motivations for accounting choice. These are contracting, asset pricing, and influencing external parties. Contracting results in earnings management to, for example, increase compensation or avoid debt covenant violation. The second category concerns attempts to influence asset prices, either as a mechanism by which better informed insiders can signal their information, or for self-interested reasons contributing to compensation or reputation. The third category concerns attempts to influence the decisions of third parties such as the Inland Revenue, for example by reducing taxable income.

Earnings management for purely self-interested reasons is assumed to be undesirable, whereas earnings management arising from other motives, such as information signalling, may be beneficial for users of accounts. However, purely opportunistic earnings management may be rare. Earnings management to increase managerial compensation or reputation may frequently have benefits for other parties, if contracts have successfully aligned management's interests with those of owners or lenders. Auditors may be less concerned, and therefore less conservative, over earnings management which is in shareholders' benefit, even when there is also an opportunistic motive. This will limit researchers' ability to detect auditor conservatism, unless opportunistic earnings management can be isolated for study.

Prior research on the relation between earnings management and auditor size assumes that earnings management is opportunistic (e.g. Francis et al., 1999; Becker et al., 1998). Fields et al. (2001) criticise accounting choice research in general for its failure to distinguish between different motives for earnings management. For example, they conclude that the evidence with respect to the stock market effects of earnings management actions is mixed, and that one reason for this may be that investors' perceptions of these actions vary across motives. Fields et al. argue that it is not clear whether the conclusions of existing studies are attributable to the specific motivations they profess to analyse, because results are generally consistent with many motivations. Christie and Zimmerman (1994) similarly argue that 'many of the empirical regularities interpreted as evidence of opportunism can also be interpreted as occurring for efficiency reasons'. The same accounting choices that maximise managerial compensation may also increase asset valuations and be desirable from a shareholder's perspective.

If this problem is viewed as one of correlated omitted variables, then the solution would be to add control variables to proxy for the omitted determinants. For example, if firms with earnings-related compensation contracts also have high political costs, then a relationship may be observed between accounting choice and compensation contracts when in fact they are driven by the political costs. However, this would require the identification of a suitable proxy variable (for political costs), and that the proxy could be measured with a reasonable degree of accuracy.

Unfortunately, the proxies used in this chapter are likely to be too coarse to fully capture the different motivations for earnings management. For example, one reason why company size is included as a regressor, is as a possible proxy for political costs. Similarly, gearing (leverage) is included to proxy for debt-covenant effects.

Because of these difficulties, I can not claim to be able to distinguish fully between different (possibly conflicting) motives for earnings management in this Chapter.

The main focus of the Chapter is to examine the relationship between auditor size and discretionary accounting accruals (DA), after controlling for the auditor selection. On doing so, I find no evidence that large audit firms constrain income-increasing (positive) DA, whereas there is evidence that they encourage negative DA. The overall impact is to reduce reported earnings. Whilst this is consistent with increased conservatism in large auditors, it is surprising that they do not appear to constrain income-increasing accruals. One possible explanation is that by failing to properly focus only on opportunistic earnings management, any conservative auditor effect on opportunistic income-increasing accruals is masked or diluted by (favourable) auditor reaction to other explanations for income-increasing earnings management (assuming auditors can distinguish them). Other possible explanations for this result are discussed later in the text. As the precise reason remains unanswered, these issues are left for future research. However, auditors are unlikely to apply exactly the same benchmark model for over or understatement as applied in this chapter, therefore the distinction between these two sets of auditor behaviour may be spurious.

The remainder of this section motivates the use of discretionary accruals as a measure of earnings management, and discusses prior evidence of the relation between auditor size and earnings management. Section 2 describes the cross-sectional modified Jones model used to estimate the DA, and Section 3 the self-selection methodology (which is identical to that used in Chapter 2). Section 4 describes the hypothesis tested and motivates the explanatory variables included in

the models. Section 5 describes the data and Section 6 presents the results. The final section concludes.

1.1 Earnings Management and DA

Earnings management may be achieved in many ways. Some accounting standards allow choices. For example, in the UK stocks may be costed using a choice of either unit cost, average cost or FIFO (first-in, first-out).[35] Which method is chosen will affect both profits and asset values. Other standards allow transactions to be deliberately structured so as to qualify for a certain accounting treatment. For example, leases may be treated as either operating or finance leases, depending on the terms of the contract, which affects both charges to the profit and loss account, and balance sheet asset values.[36] At the extreme, 'real' operating decisions may be made, for example to increase production (and hence closing stocks) so that cost of sales is reduced and profits increase. There are also choices concerning the level of disclosure, or timing of adoption of new standards, that affect reported results or the impression that they leave. I do not consider all the methods by which earnings management takes place, simply the net effect as measured by DA.

Earnings management is closely linked to accruals because published accounting earnings are required to be prepared using the accruals concept.[37] In other words, income and expenditure are recognised in the financial statements in the period to which they relate, regardless of the actual timing of the associated cashflows. A simple illustration would be the cash purchase of an asset that is used to generate income over several years. The cash outflow occurs immediately, but the

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[35] In the US, the relevant standard also allows the use of LIFO (last-in, first-out), which is forbidden by SSAP 9 in the UK.

[36] The current accounting treatment is governed by SSAP 21, however the ASB discussion paper 'Leases: Implementation of a New Approach' proposes a change in the accounting treatment to prevent such transaction structuring.

[37] The alternative, cash flow accounting, leaves little scope for manipulation.

cost is recognised in the profit and loss account in instalments (depreciation) spread over the life of the asset, in a pattern which reflects its consumption. Accruals play a major role in normal, day-to-day accounting. In contrast, choices over accounting policy, transaction structuring or the timing of adoption of new accounting standards are infrequent and may be limited to particular transactions, industries or windows of time.

Application of the accruals concept usually requires judgement on the part of managers. Examples include the length of fixed assets' useful economic lives, the timing of revenue recognition, and the creation or classification of provisions (including stock obsolescence and doubtful debts) and contingent liabilities. Because judgement is involved, accruals are open to manipulation. They are therefore likely to present important opportunities for earnings management. Accruals are also relatively cheap to manipulate (compared to making changes in accounting policy), and opaque in nature (Young, 1999). Studying accruals rather than individual accounting choices enables the net effect of earnings management to be examined, in so far as this is captured by the model used. The models predict the non-discretionary component of accruals due to genuine changes in operating activity. An academic literature has developed in which the extent to which managers deliberately manipulate reported earnings is measured in terms of the discretionary component of total accruals (see e.g. Jones, 1991; Healy, 1985; DeAngelo, 1986). These studies find that high values of DA indicate earnings manipulations.

An alternative literature seeks to identify earnings management by considering earnings benchmarks. Burgstahler and Dichev (1997) and Degeorge et al. (1999) observe discontinuities in the distribution of earnings just below the thresholds of zero earnings, zero change in earnings (from prior year), and meeting forecast earnings.

Too few companies report small losses and decreases in earnings, whereas too many companies report small profits and increases in earnings. This literature does not depend upon the estimation of levels of DA to infer the presence of earnings management, although as discussed above they are likely to be an important means by which it is achieved. This alternative approach is adopted in Chapter 5.

1.2 Previous Research

Most prior studies (as this one) only examine reported DA, or in other words, instances of actual earnings management in the financial statements. It is not generally possible to observe earnings management *attempts* in the form of pre-audit financial statements. However, Nelson et al. (2000) survey auditors working for an (anonymous) Big Five audit firm. They examine managers' attempts at earnings management, and auditors' decisions to waive or reject such attempts. They find that 60% of earnings management attempts (EMAs) are income increasing, and that in 43% of EMAs, the auditors require adjustment. Auditors are found to be most likely to waive adjustment of an EMA when it decreases current-year income, is governed by an imprecise accounting standard or is structured to meet a precise standard, is considered immaterial, or is attempted by a large client.

Several studies examine the relationship between auditor size and earnings management. Francis et al. (1999) perform univariate tests of differences in reported DA between US clients of large (Big 6) and small auditors. They find that clients of large audit firms have lower levels of absolute DA than those of small audit firms. They also have, when tested separately, lower levels of both positive and negative DA. Therefore, Francis et al. present evidence that large auditors are both more conservative (less likely to be associated with high values of income-increasing DA) and more accurate (less likely to be associated with high values of absolute DA).

Becker et al. (1998) find similar results with respect to signed and absolute DA using US data. They perform a univariate analysis with respect to absolute DA, and a multivariate analysis with respect to signed DA. After controlling for client characteristics in the multivariate analysis, they find that clients of non-Big 6 auditors report DA that are, on average, 1.5 - 2.1% of total assets higher than those reported by clients of Big 6 auditors. Gul et al. (2002) also report a significant negative association between large audit firms and reported DA.

In the UK, Gore et al. (2001) examine the relationship between the provision of non-audit services, auditor size, and earnings management. They find that large (Big 5) auditors are more effective in constraining earnings management to avoid losses and earnings decreases, when fees for non-audit services are high. Peasnell et al. (2000) include an auditor size dummy variable as a control in a study of DA and board monitoring by outside board members and audit committees. They also report a negative association between auditor size and earnings management to avoid losses, but it is not significant in their study. In addition, they find no significant association between auditor size and earnings management to avoid earnings decreases. Therefore the evidence of a quality differential for earnings management in the UK is less convincing.

Prior studies may suffer from self-selection bias. Both Francis et al. and Becker et al. qualify their findings by acknowledging that firms self select into large- and small- audited companies. Indeed, this process is two-way, as auditors may also screen their clients. Becker et al. note that 'it is possible that non-Big 6 auditors are preventing a higher proportion of unwarranted accruals [than the Big 6], but their clients have relatively higher levels of pre-audit earnings management'. Francis et al. note more generally that 'it is possible that [Big 6 and non-Big 6 audited companies]

may differ from each other in ways that systematically affect the estimation of expected accruals'. In particular, Francis et al. argue that companies with greater propensity to generate accruals are more likely to hire large auditors (to enhance the credibility of the results which they do report).

Consider the possibility that companies which choose large audit firms share characteristics which are also associated with lower (absolute or signed) DA (Becker et al., 1998). This implies that even if large auditors were no more conservative or accurate than small auditors, their clients may still report lower DA than small auditors' clients. Alternately, large auditors' clients may share characteristics that are also associated with high DA (Francis et al., 1999). This would imply that, if their clients report lower DA than small firms' clients, large auditors are more conservative than previously found. If high quality clients choose high quality auditors, then the relationship between auditor choice and DA will depend upon the underlying motives for earnings management and the definition of 'high quality' clients. This is discussed further in Section 1.3.

This chapter differs from prior studies by explicitly controlling for the endogenous nature of the auditor choice within a two-stage self-selection model. This corrects for the incidental truncation of the sample due to companies' auditor choices. First, a probit model of auditor choice is estimated. Then, the (signed) DA (estimated using a cross-sectional version of the modified Jones model) are regressed against control variables and the 'inverse Mills ratios' which are generated from the auditor choice model. This methodology is described in detail later in the chapter; however it is identical to that employed in Chapter 2.

After controlling for auditor choice in this way, I find that although large auditors' clients report higher signed DA with large auditors than other companies

would, companies hiring large auditors report significantly lower signed DA overall. The former is the selectivity effect, the latter is due to auditor characteristics. These results are consistent with large audit firms being more conservative, as expected.

By finding significant selectivity effects, I show that Big 6 and non-Big 6 audited companies differ from each other in ways that systematically affect accruals, as suggested by Francis et al. (1999). After partitioning the sample, I find that clients of small auditors report significantly less positive DA with small auditors than other companies would. I also find that clients of large auditors report significantly less negative DA with large auditors than other companies would.

Finally, I find no evidence that large auditors in the UK are more accurate than other auditors (in terms of bias to accounting numbers in any direction), as univariate tests find no significant difference between the absolute level of DA reported by clients of large and small auditors.

1.3 The Endogenous Auditor Choice

In common with prior studies, I suggest that companies hiring certain auditors may share characteristics which also influence DA. This section discusses the determinants of auditor choice, and draws some inferences for the likely direction of influence on DA. I propose that the direction will depend upon the motives for engaging in DA. However, this direction is not always easy to determine.

Recall that, in a non-mandatory audit setting, Melumad and Thoman (1990) show theoretically that a company's decision whether or not to hire an auditor can have signalling value. A company with favourable private information has a greater incentive to hire an auditor to attest to this information, than a company with unfavourable private information. Theory also suggests that the type of auditor hired may be an important signal where auditing is mandatory. In this case, Melumad and

Thoman show that the signalling value of choosing whether to hire an auditor is lost. However, Titman and Trueman (1986) and Datar et al. (1991) show that managers with favourable private information prefer to hire more accurate auditors, where accurate auditors are more costly to hire.

Managers with favourable private information may also attempt to signal this using earnings management. Subramanyam (1996) finds that both non-discretionary accruals (NDA) and DA are positively associated with firm valuation. Signalling motivations for earnings management are also suggested by Fields et al. (2001). Therefore, managers with favourable private information may use DA as a means to communicate this information to outsiders. Managers with favourable information have signalling incentives both to hire large (high quality) auditors, and to engage in (presumably) income-increasing earnings management.

If earnings management is motivated by signalling, studies of auditor choice imply that (high quality) clients of large auditors would report more positive DA with large auditors than other companies would. In turn, this would imply that prior studies of audit quality would underestimate the effect of large auditors on earnings management. However, I do not find evidence of this type of selectivity effect when I partition my sample into income-increasing and income-decreasing DA.

Francis et al. (1999) show that companies with greater *potential* to engage in earnings management via DA are more likely to hire large auditors. They propose that this is to convey the credibility of the earnings which such companies do report, where large auditors are higher quality. This is consistent with their finding that clients of large auditors actually report lower DA than those of other auditors. Their assumption is that earnings management is always undesirable, and they do not control directly for selectivity effects.

If earnings management is purely opportunistic, and hence always undesirable, then a high quality company would be one which simultaneously reports low levels of DA and hires a high quality auditor. One would therefore expect that clients of large auditors would report lower levels of (both income-increasing and income-decreasing) DA with large auditors than other companies would. This would imply that prior studies overestimate the effect of large auditors on earnings management. However, again I do not find evidence for this type of selectivity effect. Although I find that clients of large auditors report significantly less negative DA with large auditors than other companies, I find that (contrary to expectations) clients of *small* auditors report significantly less positive DA with small auditors than other companies would.

If earnings management is undertaken to avoid debt-covenant violation, to influence external parties without recourse to auditor litigation, or to increase share value then it may benefit both management and shareholders. However, whether a company which engages in this type of earnings management is more or less likely to hire a large auditor is unclear from studies of auditor choice. Similarly, if earnings management is undertaken for a combination of reasons, then the direction of influence on auditor choice is impossible to determine. The selectivity effects I find are not consistent with a simple, single-motivation story of purely opportunistic or information-signalling earnings management. This illustrates the complexity of the issues surrounding accounting choice, an area which requires further investigation.

2. ESTIMATING DA

I use accruals as a measure of the net effect of earnings management activity. Because not all accrual decisions represent earnings management, total accruals (TA) are decomposed into discretionary and non-discretionary accruals (DA and NDA

respectively). TA are defined as the difference between income before extraordinary items and operating cashflows, or, equivalently, as the change in non-cash current assets minus the change in current liabilities (excluding the current portion of long-term debt), minus depreciation and other long-term charges. While TA are observable, the discretionary and non-discretionary components are not. Consequently, DA are estimated by imposing a model of NDA on TA.

Several different models of NDA have been used in the literature to estimate DA. The main models are by DeAngelo (1986), Healy (1985), and Jones (1991). Dechow et al. (1995) created the Modified Jones Model, and DeFond and Jiambalvo (1994) used a cross-sectional version of the Jones Model. These models are discussed in detail by several papers which compare the different methods (e.g. Dechow et al., 1995; Guay et al., 1996; Young, 1999; Bartov et al., 2001).

The Healy Model simply assumes that NDA for each period are zero. In this model, the DA for each period equal TA, scaled by prior period total assets. The DeAngelo Model assumes instead that NDA are constant for a steady-state firm, so that any change in TA from one period to the next is attributable to accounting discretion. Therefore in this model, DA equal the change in TA, again scaled by prior period total assets.[38]

In contrast, both the time series and cross-sectional versions of the Jones and Modified Jones Models employ a regression-based expectation model to control for variations in NDA. The time-series versions require several years of data prior to the event year in order to form coefficient estimates for each firm individually. The cross-sectional versions form coefficient estimates for industry and event-period matched portfolios for each sample firm.

[38] Friedlan (1994) modified the DeAngelo model by scaling by sales revenue in place of prior period total assets, in order to proxy for operating activity and relax the steady-state assumption.

Dechow et al. (1995), Guay et al. (1996) and Young (1999) all report evidence that existing (time-series) models of DA induce systematic measurement error (the sign and/or magnitude of the measurement error in the estimated DA is related to the components of the NDA models). Of the various models examined, they find that the Jones- and DeAngelo-based procedures appear to perform best. Bartov et al. (2001) examine the cross-sectional Jones Models, and find that they perform better than their time-series counterparts in detecting earnings management in firms receiving modified audit reports. The cross-sectional versions may also be preferred to time-series versions as the data requirements of the latter are likely to lead to survivorship bias, and the models have to assume that the estimated coefficients are stationary through time (in contrast, the cross-sectional versions assume that the estimated coefficients are constant within industry groups). As cross-sectional Jones Models have also been used by Francis et al. (1999) and Becker et al. (1998), it is a cross-sectional (Modified) Jones Model which is used to measure DA in this chapter.

The original Jones (1991) Model is a regression-based model incorporating proxy explanatory variables to control for variations in NDA associated with changes in operating activity (namely, the change in revenue) and the depreciation charge (namely, gross property plant and equipment). Genuine changes in operating activity will directly affect accruals by affecting levels of debtors, stock and creditors. Similarly, expansion or reduction in a firm's fixed asset base will directly affect total accruals by affecting the depreciation charge, all else remaining constant. However, using revenues to control for genuine changes in operating activity is problematic because revenue can also be manipulated. For example, it can be overstated by recognising sales in a period before the one in which they are actually made, or when the eventual cash receipt is doubtful. Overstatements of revenue will also overstate

receivables in the accounts (recognising a sale when no cash has been received will create a debtor in the accounts), and hence total accruals.

To capture possible revenue manipulation, Dechow et al. modify the Jones procedure by adjusting for the change in receivables (see Eq. 2 below). It is the modified form of the Jones model that is employed in this chapter.

The cross-sectional version of the Jones Model differs from the time-series version in that the regression model parameters are estimated across all firms in a particular industry in, rather than for individual firms over a period of time preceding, the year of interest. The estimation of this model is described in Section 2.1.

An alternative to the Jones-type models of estimating DA exists, although it is not employed in this thesis. The surveys discussed above indicate that although the existing models detect earnings management, they do so with low power (e.g. Dechow et al., 1995). Kang and Sivaramakrishnan (1995) note the problems associated with the existing models, and instead propose an instrumental variables approach to measuring DA. However, Fields et al. (2001) comment that this approach has not been thoroughly tested or widely adopted by other researchers, in their view because of problems designing appropriate applications for the methodology.

As the DA models suffer from measurement error, for example because they may capture abnormal economic transactions rather than abnormal accounting transactions (they rely on forming expectations of NDA over time or industry groups), Chapter 5 uses a different approach to studying earnings management. This approach identifies net earnings management around earnings benchmarks without estimating DA, and complements the results presented in this chapter.

2.1 The Cross-Sectional Modified Jones Model

This section describes the method of estimating DA. First, total accruals are regressed against the change in revenues and the value of property, plant and equipment for each industry,[39] as follows:

$$TA_{it} / A_{it-1} = \alpha (1 / A_{it-1}) + \beta_1 (\Delta REV_{it} / A_{it-1}) + \beta_2 (PPE_{it} / A_{it-1}) + \nu_i \quad (1)$$

where TA_{it} are total accruals for company i in period t, A_{it-1} are the beginning of period total assets, ΔREV_{it} is the change in revenue from period t-1 to t, and PPE_{it} is the net book value of property, plant and equipment (fixed assets) in period t. Eq. (1) takes all changes in revenue into account, as whether resulting from earnings management or not, they will still affect total accruals.

The industry-specific estimates of the coefficients are then used to estimate the DA for each individual company:

$$DA_{it} = TA_{it} / A_{it-1} - \hat{\alpha} (1 / A_{it-1}) - \hat{\beta}_1 [(\Delta REV_{it} / A_{it-1}) - (\Delta REC_{it} / A_{it-1})] - \hat{\beta}_2 (PPE_{it} / A_{it-1}) \quad (2)$$

where ΔREC_{it} is the change in receivables from period t-1 to t, and all other variables are as previously defined. By deducting the change in receivables from the change in revenues, Eq. (2) implicitly assumes that all changes in credit sales result from earnings management. The remaining change in sales arises from sales where cash

[39] The industries used correspond to mineral extraction, general industrials, consumer goods, services, wholesale trade, and real estate. Other financials and utilities are excluded, as discussed in Section 5. Companies are placed into industry groups according to their 2-digit standard industry classification (SIC) codes (these are the first two digits of the full 5-digit SIC codes). The groups are as follows:

Industry	2-digit SIC codes
Mineral extraction	10-14
General industrials	20, 21, 23-35, 45
Consumer goods	1, 2, 5, 15-19, 36, 85
Services	22, 37, 50, 52, 55, 60-64, 71-74, 80, 90-93
Wholesale trade	51
Real estate	70
Utilities	40, 41
Financials	65-67

has been received, and is therefore assumed to represent genuine changes in operating activity, and hence to affect only NDA.

3. SELF-SELECTION METHODOLOGY

3.1 Effects of the Endogeneity of Auditor Choice

Auditor choice is thought to be an endogenous variable in a model of DA, because auditors are not assigned randomly to firms. A company choosing (and being accepted by) a large auditor may be systematically more or less likely to report high values of DA than a company choosing a small auditor. In particular, unobserved firm characteristics such as managers' private information may influence both auditor and accounting choices, as discussed in Section 1.3.

To determine whether large auditors are more or less conservative in their attitudes to DA than other auditors, it is necessary to compare the values of DA reported by identical firms hiring different auditors. But, whilst it is possible to observe the accruals reported by companies hiring their chosen auditors, it is not possible to observe the accruals they would have reported if they had hired auditors of alternative size. The endogeneity of the auditor choice results in incidental truncation of the sample of DA. However, this can be controlled for by modelling the auditor choice, as described in Section 3.2 below.

This chapter controls for the effects of auditor selection on DA using a two-stage model. In the first stage, I model UK companies' selection of auditors. In the second stage, I model the DA reported by companies choosing large (Big 6) and small auditors, separately, controlling for the selection effects. Finally, I compare the intercept terms of the two fitted DA models, and test whether these are significantly different. This indicates the association between DA and audit firm size. The methodology is identical to that employed in Chapter 2.

3.2 *The Two-Stage Selection Model*

In the first stage I estimate a probit model of auditor choice. I observe a dichotomous variable Big_i such that $Big_i = 1$ if company i chooses a large auditor, and $Big_i = 0$ otherwise. The model assumes that there is an underlying response variable Big_i^* such that

$$Big_i^* = \gamma' W_i + u_i \tag{3}$$

and $Big_i = 1$ if $Big_i^* > 0$, and $Big_i = 0$ otherwise. W_i are company characteristics influencing the auditor choice. The model is identified if at least one explanatory variable is included in the auditor choice model but not in the audit reporting model.

In the second stage I estimate a regression model of DA. I first estimate the accruals for each company i using the modified cross-sectional Jones model described in Section 2, and secondly assume that

$$DA_i = \beta' X_i + \delta Big_i + \varepsilon_i \tag{4}$$

where X_i are company characteristics.

The error terms u_i and ε_i are assumed to have a bivariate normal distribution with zero means, standard deviations σ_u and σ_ε, and correlation ρ. Note that, if there was no endogeneity, ρ would be equal to zero, and the expected values of DA_i conditional on Big_i would be $E[DA_i \mid Big_i=1] = \beta' X_i + \delta$ and $E[DA_i \mid Big_i=0] = \beta' X_i$. In the presence of endogeneity, ρ is non-zero, and the conditional expectations of DA_i are biased as follows:

$$E[DA_i \mid Big_i = 1] = \beta' X_i + \delta + \rho\sigma_\varepsilon \frac{\phi(\gamma' W_i)}{\Phi(\gamma' W_i)} \tag{5}$$

$$= \beta' X_i + \delta + \beta_\lambda \lambda_i^1 \tag{6}$$

$$E[DA_i \mid Big_i = 0] = \beta' X_i - \rho\sigma_\varepsilon \left[\frac{\phi(\gamma' W_i)}{1 - \Phi(\gamma' W_i)} \right] \tag{7}$$

$$= \beta' X_i + \beta_\lambda \lambda_i^0 \tag{8}$$

where $\lambda_i^1 = \frac{\phi(\gamma' W_i)}{\Phi(\gamma' W_i)}$ and $\lambda_i^0 = \frac{\phi(\gamma' W_i)}{1 - \Phi(\gamma' W_i)}$.

To control for this bias, the predicted values of the 'inverse mills ratios' λ_i^1 and λ_i^0, obtained from the estimation of the auditor choice model, must be included as covariates in the appropriate regression models, which are estimated separately over companies choosing large and small auditors as follows:

$$DA_i^j = \beta_j' X_i + \delta_\lambda \lambda_i^j + \varepsilon_i \tag{9}$$

where $j = 1$ if the chosen auditor is a large (Big 6) auditor and $j = 0$ otherwise.

The two regression models (9) including the inverse Mills ratios, estimated separately over companies choosing large and small auditors, may now be used to obtain unbiased predictions of the DA reported by a company which hires a large or small auditor, conditional on that company having chosen a large or small auditor respectively. In other words, the models correctly predict the DA reported by companies with certain characteristics (those leading them to choose large or small auditors) *with their chosen auditors.* The predicted values therefore reflect a combination of both company and auditor characteristics.

The sign and significance of the coefficient on the inverse Mills ratio determines whether there are selectivity effects. It shows us whether the value of DA reported by a *randomly* chosen company hiring a certain auditor size is likely to differ from those of a company with (unobserved) characteristics that lead them to hire that auditor type. For example, if companies choosing large auditors are more likely to report high DA with large auditors than other companies are, one would expect to see a significantly positive coefficient on the inverse Mills ratio in the large auditor DA

model. The coefficient on the inverse Mills ratio reflects (unobserved) company characteristics.

Finally, and most importantly, the intercept terms from the two audit reporting models are used to compare the (unconditional) value of DA reported by a randomly chosen company when hiring a large or a small auditor. If there is no difference in auditor conservatism, these intercepts will not significantly differ. If large auditors are more conservative than small auditors, the intercept term in the large auditor regression will be significantly lower than that in the small auditor regression. The intercept values therefore reflect auditor characteristics.

4. HYPOTHESIS AND MODEL

4.1 The Hypothesis

I wish to test the hypothesis that large auditors are more conservative than other auditors, against the null hypothesis that there is no difference in auditor conservatism.

The null and alternative hypotheses can be expressed as follows:

H0: $E[DA_i^1] = E[DA_i^0]$

HA: $E[DA_i^1] < E[DA_i^0]$

where $E[DA_i^j]$ is the expected level of DA reported by company i with auditor j, where $j = 1$ is a large ('Big 6') audit firm and $j = 0$ otherwise.

4.2 The Auditor Choice Model

Theoretical studies of auditor choice show that, earnings management aside, a company with favourable private information has a greater incentive to hire a high quality auditor to attest to this information, than a company with unfavourable private information. Unfortunately, managers' private information is unobservable to the researcher (although it may be observed by the auditor) and so cannot be included in

empirical models of auditor choice. Empirical studies of auditor choice report instead that Big 6 (5, or 8) audits are demanded as a function of increasing agency costs. Proxies for agency costs have included managerial ownership, managerial compensation schemes, gearing, and the shareholdings of large blockholders (Francis and Wilson, 1988; Johnson and Lys, 1990; DeFond, 1992; Firth and Smith, 1992). However, the main determinant of auditor choice in these studies is company size.

As in Chapter 2, auditor choice is also hypothesised to depend upon losses, complexity, the proportion of non-executive directors on the Board, and directors' personal affiliations with audit firms. In particular, companies are expected to hire large (small) audit firms more often when directors influential in the auditor choice disclose that they previously worked for large (small) auditors.

The model of auditor choice employed in this chapter has dependent variable BIG_i such that $BIG_i = 1$ if company i chooses a large (Big 6) auditor, and $BIG_i = 0$ otherwise. The following explanatory variables are included in the final auditor choice model: total assets (ASSE) and sales revenue (REV) as measures of company size, a dummy variable equal to 1 if the company made losses in either the current or prior year (LOSS), the proportion of non-executive directors on the Board (NEX) as a proxy for demand for audit quality, the number of overseas subsidiaries owned by the company (OS) as a proxy for auditee complexity, and director affiliation dummy variables. The affiliation variables are LAF (equal to 1 if the influential director discloses an affiliation with a large auditor, and 0 otherwise) and SAF (equal to 1 if the influential director discloses an affiliation with a small auditor, and 0 otherwise).[40]

[40] Clearly, any variables based on accounting numbers may be contaminated with earnings management, especially regarding losses if earnings are managed to avoid losses. This is an unfortunate problem as it is hard to find alternative accounting numbers to use which are not similarly contaminated.

In addition, Francis et al. (1999) argue that the demand for Big 6 audits is based, in part, on mitigating the opportunities for earnings management, as evidenced by the length of a company's operating cycle and capital intensity.

Therefore, I include two variables representing the propensity to generate accruals in an alternative specification of the auditor choice model. These are the operating cycle (CYCLE), defined as the sum of debtor months and stock months, and capital intensity (CAPINT) defined as fixed assets divided by sales, after Francis et al.. However, these variables are not found to be significant and are dropped from the final auditor choice model (see Section 6).

4.3 The DA Models

Several regressions of DA are performed. In the first case, DA are regressed against the dummy variable representing chosen auditor size (BIG) and control variables representing the company characteristics which are expected to influence DA. This does not control for the endogeneity of the auditor choice, but allows comparison with the results of Becker et al. (1998).

Secondly, DA are regressed against the control variables alone, but the regressions are performed separately over the clients of large and small audit firms. This also does not control for auditor choice, but is necessary in order to compare the difference in the intercept terms with the difference obtained when controlling for auditor choice. Furthermore, it allows the estimated coefficients to differ between large and small auditors' clients.

In the final case, the regressions are also performed separately over the clients of large and small audit firms, but this time the inverse Mills ratios obtained from the probit auditor choice regression are included. In this way, the final regressions control for auditor choice.

In each regression of DA, the control variables are company size (ASSE), the proportion of non-executive directors on the Board (NEX), financial gearing (GEAR), and a proxy for incentives to smooth earnings (SMOOTH).[41] SMOOTH is defined as the difference in pre-managed earnings and the median earnings (scaled by beginning of period total assets) for the industry in the prior year. Pre-managed earnings are defined as operating profit (scaled by beginning of period total assets) minus DA. Note that estimated DA are scaled by beginning of period total assets, by construction.

ASSE is included as a control variable to capture underlying size and performance effects (Becker et al., 1998; DeFond and Subramanyam, 1998; Young, 1999; and Gore et al., 2001).[42] Firm size may also proxy for political costs (Hand and Skantz, 1998). Nelson et al. (2000) find that auditors are more likely to waive earnings management attempts by large clients, even after controlling for the materiality of the attempt. High values of ASSE are therefore expected to be associated with high values of DA.

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[41] The absolute value of total accruals (scaled by beginning of period total assets), TA, is also included by Becker et al. (1998) to 'control for the possibility that firms with larger absolute values of total accruals also have larger DA'. Contrary to their expectations, they find that the coefficient on this variable is negative (and significant). However, they note that this result may be mechanically driven as the estimation procedure for DA explicitly uses the relationship between TA, NDA and DA, and NDA tend to be negative due to depreciation. This variable is included in some alternative specifications of the model, but is not used in the main results of the chapter. Results for the alternative specifications are not reported here, but are qualitatively identical to those reported in the chapter.

[42] Controlling for operating cashflows is also potentially important as both Dechow et al. (1995) and Young (1999) note an important association between extreme financial performance, as measured by cash flows, and accruals. Dechow et al. document that firms with high (low) cash from operations tend to have low (high) TA. Young (1999) argues that high values of operating cash flows are expected to be associated with measurement error in estimated DA. Recalling that TA is the sum of DA and NDA, if extreme positive (negative) cash flows in a particular period tend to result in negative (positive) NDA (Samuels et al., 1989), then models of DA may incorrectly attribute some of the NDA to estimated DA. High values of operating cashflows are therefore expected to be associated with low values of DA. However, operating cashflows are highly correlated with company size (ASSE), having a correlation coefficient of 0.697 for the data used in this study (none of the other variables have correlation coefficients greater in magnitude than 0.1). Including (rank transformed) operating cashflows as an additional covariate does not change the main results of this chapter, but the (statistically significant) coefficient on the variable has the opposite sign to that expected. As this is likely due to the correlation between company size and cash flows, cash flows are excluded from the models presented here.

GEAR is included as a proxy for agency costs, and because the debt-equity hypothesis predicts a positive association between leverage and income-increasing accounting choices (Watts and Zimmerman, 1986). This hypothesis is supported by prior empirical evidence (Christie, 1990; Holthausen and Leftwich, 1983). NEX is included as the presence of non-executives on the Board is expected to decrease opportunities for earnings management (Peasnell et al., 2000). NEX is therefore expected to have a negative association with DA whereas GEAR is expected to have a positive association. SMOOTH represents incentives for earnings management to meet target earnings figures (Young, 1999, 1998; Chaney and Lewis, 1998; and DeFond and Park, 1997). SMOOTH is expected to be negatively associated with DA.

5. DATA AND DESCRIPTIVE STATISTICS

The initial cross-sectional sample for the analysis consists of the 1,326 companies registered (listed) with a UK stock exchange used in Ireland and Lennox (2002) [Chapter 2]. Accounting data are taken from the most recent annual reports filed on OneSource UK Companies Volume One, July 1998.[43] Company year ends range from 31 May 1996 to 31 March 1998, although there is only one observation per company.

The PriceWaterhouseCoopers Corporate Register is used to identify company directors and corporate affiliations with audit firms. In deciding whether companies are affiliated with audit firms, it is generally assumed that it is the finance director who has the strongest boardroom influence over audit appointments. When a director discloses past employments with both large and small audit firms, the affiliation is

[43] OneSource is a commercially available database of financial information relating to UK companies. The information is held on two CD-ROMs, Volume 1 and Volume 2. Volume 1 holds data on 110,001 UK companies, including all public limited companies and all companies with more than 50 employees, the remainder of the sample comprising the largest UK companies not already included, selected on the basis of turnover, total assets, net worth, or shareholder funds, whichever figure is the highest. Volume 2 holds data on the next 250,000 UK companies, selected on the same basis, with the lowest cut-off value at approximately £38,000.

assumed to be with the most recent firm. Where finance directors are not identified (in approximately 10% of companies), the most influential director is assumed to be the either the company secretary, the CEO or the company chairman, depending on who is identified and/or is a qualified accountant. The procedure is identical to that described more fully in Chapter 2.

Information on subsidiary companies is collected from Extel. The remaining data for the study is taken from OneSource. As well as identifying the company's current auditor, OneSource contains historical accounting data taken from published financial statements, and accounting ratios.

In common with other earnings management studies, financial companies and utilities are excluded (see e.g. Becker et al., 1998), leaving 1,238 companies. Financial companies are excluded because there are fundamental differences in the nature of their accruals and cashflows. Utilities are excluded both because regulation may make the incentives to manage earnings different from the incentives in unregulated industries, and because there are just 20 companies in the industry group for the purposes of estimating DA. Because of missing accounting data for a further 201 companies, the final estimation sample consists of 1,037 companies. 819 of the companies are audited by large audit firms, and 218 by small audit firms.

Descriptive statistics for the variables of interest and the estimated DA for the companies in the final estimation sample are summarised in Table 1 below. Descriptive statistics for the variables used to create the estimated DA are reported in Appendix C.

Table 1
Descriptive Statistics – Untransformed Variables

Variable	*Mean*	*Median*	*Standard Deviation*	*Min*	*Max*
BIG	0.790	1	0.408	0	1
DA	0.175	0.045	1.987	-58.549	5.628
ABSOLUTE(DA)	0.448	0.155	1.944	0.000	58.549
Panel A					
ASSE (£'000s)	357,349	32,129	1.76 M	-13,579	42.4 M
NEX	0.294	0.300	0.079	0	0.462
Panel B					
GEAR	31.821	26.300	163.266	-3,792	3,020
SMOOTH	-0.137	-0.052	2.174	-6.423	66.173
Panel C					
REV (£'000s)	551,779	75,803	2.30 M	0	56.6 M
OS	5.047	1	10.098	0	96
LOSS	0.148	0	0.355	0	1
LAF	0.261	0	0.440	0	1
SAF	0.041	0	0.200	0	1
CYCLE (months)	4.805	3.792	14.103	0.072	424.409
CAPINT	0.459	0.212	0.825	0.002	12.182

Notes
There are 1,037 observations. Values for CYCLE and CAPINT are missing for 16 observations. Accounting figures are reported in £'000s.
Panel A: Variables included in both the DA and the auditor choice models
Panel B: Variables included in the DA models only
Panel C: Variables included in the auditor choice model only

DA is estimated discretionary accruals
ASSE is total assets (net of current liabilities)
NEX is the proportion of directors who are non-executive
GEAR is financial gearing (leverage), defined as:

$$\frac{\text{Preference capital + subordinated debt + loan capital + short-term borrowings}}{\text{Capital employed + short-term borrowing - intangibles}}$$

SMOOTH is (pre-managed earnings – target earnings) where pre-managed earnings are defined as operating profit (scaled by beginning of year total assets) – estimated DA, and target earnings are the median value of prior-year industry earnings (scaled by beginning of year total assets)
REV is sales revenue
OS is the number of overseas subsidiaries
LOSS is a dummy variable equal to 1 if the company made a loss in either the current or prior year, and 0 otherwise
LAF(SAF) is a dummy variable equal to 1 if the influential director disclosed an affiliation with a large (small) auditor, and 0 otherwise
CYCLE is the operating cycle, defined as the sum of debtor months and stock months.
CAPINT is capital intensity, defined as fixed assets / sales.

The estimated DA have a mean value of 0.175. The absolute value of DA has a mean of 0.448. However, there is an outlying observation with estimated DA of -58.549. Omitting this outlier, the mean value of DA is 0.232, and the mean absolute value of DA is 0.392.[44]

The average size of companies included in the sample is assets (ASSE) of just over £357 million and sales revenue (REV) of almost £552 million. On average, companies have 5 overseas subsidiaries and 29% of the Board of directors are non-executives. Approximately 15% of companies make losses in the current or prior year, and 26% of influential company directors report affiliations with large audit firms, compared to just 4% reporting affiliations with small audit firms.

5.1 Rank Transformations

The means and medians reported in Table 1 reveal skewness in the DA, ASSE, GEAR, SMOOTH, REV, OS, CYCLE and CAPINT variables.[45] There is also the significant outlier in the estimated DA values, mentioned above. As in Chapter 2, I correct for these problems using rank transformations.

Recall that the ranking procedure involves replacing each observation with its rank within the sample, and then dividing each observation by N+1, where N is the number of observations. The resulting ranked variables are uniformly distributed between zero and one.

Table 2 partitions the sample into 819 clients of large audit firms and 218 clients of small audit firms, and reports descriptive statistics for the transformed variables.

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[44] All the models in this chapter were re-estimated with the outlying observation omitted. The results (not reported here) are qualitatively identical. This is not surprising, as I use rank transformations.

[45] In addition, seven observations have negative GEAR, as the companies concerned have negative net worth (= capital employed + short-term borrowing - intangibles). In unreported results, these observations were firstly omitted from the sample, and secondly recoded as arbitrarily high. Results were qualitatively identical.

Table 2
Descriptive Statistics – Transformed Variables

Chosen auditor size:	*Large (Big 6)*		*Small*	
Number of observations:	819		218	
Variable	*Mean*	*Median*	*Mean*	*Median*
DA	0.155	0.044	0.250	0.050
ABSOLUTE(DA)	0.461	0.152	0.402	0.182
R(DA)	0.500	0.497	0.498	0.508
Panel A				
R(ASSE)	0.546	0.560	0.319	0.273
NEX	0.302	0.308	0.264	0.286
Panel B				
R(GEAR)	0.514	0.511	0.418	0.407
R(SMOOTH)	0.505	0.514	0.489	0.454
Panel C				
R(REV)	0.578	0.603	0.363	0.454
R(OS)	0.557	0.547	0.415	0.246
LOSS	0.145	0	0.156	0
LAF	0.276	0	0.206	0
SAF	0.027	0	0.096	0
R(CYCLE)	0.506	0.511	0.510	0.510
R(CAPINT)	0.488	0.496	0.494	0.505

Notes
Panel A: Variables included in both the DA and the auditor choice models
Panel B: Variables included in the DA models only
Panel C: Variables included in the auditor choice model only
ABSOLUTE(DA) and R(DA) are the absolute value and rank of estimated DA respectively
R(ASSE) is the rank of total assets (net of current liabilities)
NEX is the proportion of directors who are non-executive
R(GEAR) is the rank of financial gearing (leverage), where financial gearing is:

$$\frac{\text{Preference capital + subordinated debt + loan capital + short-term borrowings}}{\text{Capital employed + short-term borrowing - intangibles}}$$

R(SMOOTH) is the rank of (pre-managed earnings – target earnings) where pre-managed earnings are defined as operating profit (scaled by beginning of year total assets) – estimated DA, and target earnings are the median of prior year industry earnings (scaled by beginning of year total assets)
R(REV) is the rank of sales revenue
R(OS) is the rank of the number of overseas subsidiaries
LOSS is a dummy variable equal to 1 if the company made a loss in either the current or prior year, and 0 otherwise
LAF is a dummy variable equal to 1 if the influential director disclosed an affiliation with a large auditor, and 0 otherwise
SAF is a dummy variable equal to 1 if the influential director disclosed an affiliation with a small auditor, and 0 otherwise
R(CYCLE) is the rank of the operating cycle
R(CAPINT) is the rank of capital intensity

It can be seen from Table 2 that the distributions of the transformed variables are markedly less skewed. Companies choosing large audit firms have larger values of ASSE and REV and have greater numbers of overseas subsidiaries (OS). They are also more likely to have high GEAR and have larger pre-managed earnings in relation to target earnings (SMOOTH).

The mean value of untransformed DA is 0.155 for clients of large audit firms, lower than the mean of 0.250 for clients of small audit firms. However, in univariate tests, neither the untransformed DA nor the rank R(DA) differs significantly between clients of large and small audit firms.[46]

The mean absolute value ABSOLUTE(DA) is 0.518 for clients of large audit firms, and 0.496 for clients of small audit firms, whereas the median is 0.152 for clients of large audit firms, and 0.182 for clients of small audit firms. Neither the mean nor the median ABSOLUTE(DA) differs significantly between clients of large and small audit firms, in univariate tests. The results of the multivariate tests on R(DA) follow in Section 6.

6. RESULTS

The DA regression models are estimated first without controlling for auditor choice, and second after controlling for auditor choice. The dependent variable in all these models is the rank R(DA) of the signed estimated DA. Two versions of the probit auditor choice model are estimated. The auditor choice model is used to estimate inverse Mills ratios for inclusion in the final R(DA) regressions, which control for the auditor choice.

The results of the estimations of the DA regression models, without controlling for auditor choice, are reported in Table 3. The results of the estimations

[46] Differences in means are tested using *t*-tests; differences in medians are tested using the Wilcoxon ranksum test (Mann-Whitney two-sample statistic) and a non-parametric K-sample test (χ^2).

of the probit auditor choice model, and the DA regression models including the inverse Mills ratios, are reported in Table 4. Panel A of Table 4 contains the results of the estimation of the auditor choice model. Panel B of Table 4 contains the results of separate estimation of the DA models over clients of large and small auditors, excluding the dummy variable for chosen auditor size, but including the appropriate inverse Mills ratios among the explanatory variables.

Table 3
Estimation Results - Without Controlling for the Auditor Choice

R(DA)							
	Predicted	*Whole Sample* *Obs* = 1,037		*Large Auditors* *Obs* = 819		*Small Auditors* *Obs* = 218	
R(ASSE)	+	0.071	**	0.064	**	0.120	*
		(0.022)		(0.024)		(0.058)	
NEX	-	-0.154	*	-0.240	**	0.023	
		(0.074)		(0.090)		(0.134)	
R(GEAR)	+	0.049	*	0.050	*	0.039	
		(0.020)		(0.022)		(0.046)	
R(SMOOTH)	-	-0.772	**	-0.778	**	-0.747	**
		(0.020)		(0.022)		(0.044)	
BIG	-	-0.000		-		-	
		(0.015)					
CONSTANT	?	0.872	**	0.904	**	0.801	**
		(0.027)		(0.033)		(0.051)	
R^2		61.03%		61.57%		59.86%	

Notes:
Explanatory variables are defined in Table 2.
Standard errors in (parentheses). * = significant at the 5% level; ** = significant at the 1% level.

6.1 Without Controlling for the Auditor Choice

The results obtained from the estimation of the R(DA) model, over the whole sample and including the chosen auditor size dummy BIG, are reported in the first column of Table 3. The coefficient on BIG is negative as expected from theory and prior research, but it is not statistically significant. The control variables in the regressions

all have the expected sign, and all are statistically significant except for R(GEAR) and NEX in the small auditor client regression.

The intercept terms in columns three and four are different to each other. The intercept for companies choosing large audit firms is 0.904 and that for companies choosing small audit firms is 0.801, a difference of +0.103. This is interesting as the difference is positive, whereas the coefficient on BIG in the first column of Table 3 is negative (although insignificant). Prior studies of DA assume that the coefficients on the control company characteristics are identical for companies choosing large and small audit firms. However, Table 3 shows that this is not so. In particular, the changes in the coefficient values result in a positive difference in the intercept terms, rather than the negative difference implied by the results in column 1.

The sign of the difference in the intercept terms in Table 3, and the changes in coefficient values on the other regressors, are consistent with the results of Gore et al. (2001), who also perform separate regressions over the clients' of large and small auditors.

Unlike earlier studies (e.g. Becker et al., 1998; Gore et al., 2001), these results do not suggest that large auditors are more conservative as they are not associated with the reporting of significantly lower levels of signed DA. However, due to the endogeneity of the auditor choice, the influence of the auditor may be understated. For example, clients of large auditors may have favourable private information which leads them both to hire large auditors and to generate high DA.

Even if the coefficient on BIG were significantly negative in column 1, I would still be unable to draw any valid conclusion as to auditor conservatism as companies choosing large auditors may alternately share characteristics (e.g.

management integrity) that render them simultaneously less likely to report high values of DA (Becker et al., 1998).

In order to distinguish auditor characterstics (such as conservatism) from auditor selection effects, a two-stage model is estimated. The auditor choice is estimated first.

6.2 The Auditor Choice Model

The results obtained from the estimation of the auditor choice model, over the whole sample, are reported in Panel A of Table 4. Two versions of the model are estimated; the version in column 1 includes R(CYCLE) and R(CAPINT) as covariates, after Francis et al. (1999). However, these variables are not found to be significant, and are omitted from the second version of the model, reported in column 2, which is used to generate the inverse Mills ratios.

As expected, larger, more complex, and more risky companies are more likely to choose large audit firms. Although the coefficient on LAF, the large auditor affiliation, is not significant, it is positive as expected. The coefficient on SAF, the small auditor affiliation, is significant at less than the 1% level, and negative as expected. Thus, companies with influential directors who report a prior affiliation with small audit firms are significantly less likely to hire large auditors.

6.3 Controlling for the Auditor Choice

Without controlling for the endogeneity of auditor choice, it would appear from Table 3 that large auditors are not associated with significantly lower reported DA than other auditors.

Table 4

Estimation Results - Controlling for the Auditor Choice

Model:	*Auditor Choice*				*R(DA)*			
Sample:	*Whole Sample*				*Large Auditors*		*Small Auditors*	
	Obs = 1,021		*Obs* = 1,037		*Obs* = 819		*Obs* = 218	
R(ASSE)	1.048	*	1.109	**	0.217	**	0.299	**
	(0.459)		(0.315)		(0.042)		(0.098)	
NEX	2.122	**	2.034	**	-0.018		0.223	
	(0.594)		(0.588)		(0.102)		(0.160)	
R(GEAR)	-		-		0.051	*	0.032	
					(0.022)		(0.045)	
R(SMOOTH)	-		-		-0.768	**	-0.723	**
					(0.022)		(0.045)	
R(REV)	1.129	*	0.971	**	-		-	
	(0.484)		(0.326)					
R(OS)	0.332		0.406	*	-		-	
	(0.212)		(0.206)					
LOSS	0.477	**	0.490	**	-		-	
	(0.145)		(0.142)					
LAF	0.041		0.046		-		-	
	(0.114)		(0.113)					
SAF	-0.706	**	-0.747	**	-		-	
	(0.213)		(0.210)					
R(CYCLE)	0.193		-		-		-	
	(0.184)							
R(CAPINT)	-0.175		-		-		-	
	(0.242)							
λ^1	-		-		0.239	**	-	
					(0.054)			
λ^0	-		-		-		-0.130	*
							(0.058)	
CONSTANT	-1.028	**	-0.970	**	0.676		0.830	**
	(0.275)		(0.197)		(0.061)		(0.052)	
(pseudo) R^2	17.03%		16.76%		62.46%		60.79%	

Notes:

Panel A reports the results of the estimation of the probit auditor choice model, with independent variable $Big_i = 1$ if the chosen auditor is large (i.e. Big 6) and $Big_i = 0$ otherwise.

Panel B reports the results of the separate estimations of the OLS regression model of (rank-transformed) DA for companies choosing large (i.e. Big 6) and small auditors, after controlling for the auditor choice.

Explanatory variables are defined in Table 2, with the exception of R(CYCLE) and R(CAPINT). R(CYCLE) is the rank of the operating cycle. R(CAPINT) is the rank of capital intensity.

The inverse Mills ratios are obtained from the second auditor choice model.

Standard errors in (parentheses). * = significant at the 5% level; ** = significant at the 1% level.

The inverse Mills ratios λ^1 and λ^0 are generated from the results reported in Table 4, for the second version of the auditor choice model. The DA models are then estimated separately over companies choosing large and small auditors, including the appropriate inverse Mills ratio. These results are reported in Panel B of table 4.

The inverse Mills ratio for clients of large auditors is significant (at less than the 1% level) and positive. The inverse Mills ratio for clients of small auditors is negative, and significant at the 5% level.

The positive sign of the coefficient on the inverse Mills ratio for clients of large auditors indicates that companies which choose large auditors report higher signed values of DA with large auditors than other companies would if they also hired large auditors.

On the face of it, this is consistent with a signalling motive for earnings management. Companies may choose large auditors because they have more favourable private information, and simultaneously signal this information via higher (more positive) DA. Companies which would not choose large auditors would not have favourable private information to transmit, nor would the auditors, therefore they would not report as high DA with large auditors. However, I show later that this selectivity effect is driven by clients of large auditors reporting less negative DA with large auditors than other companies would; there is no evidence that clients of large auditors report more positive DA with their auditors than other companies would.

The negative sign of the coefficient on the inverse Mills ratio for clients of small auditors indicates that companies which choose small auditors report lower values of signed DA with small auditors than other companies would. I show later that this effect is driven by clients of small auditors reporting less positive DA with small auditors than other companies would.

6.4 Comparison of Intercepts

Comparing the intercept terms in the two R(DA) regressions reported in the second and third columns of Table 3 (i.e. without controlling for the auditor choice), although the intercept term for the large auditor regression is greater than that for the small auditor regression, the difference is not statistically significant. Finding that the intercept term is greater for the large auditor client regression is consistent with the findings of Gore et al. (2001), who also perform separate regressions of DA over large (in their case Big 5) and small audit firms.

After controlling for the auditor choice, the sign of the difference in the intercept terms is reversed. The intercept term in the R(DA) regression over large auditors' clients in Panel B of Table 4 is 0.676, significantly lower than that for small auditors' clients, 0.830.

This implies that, after controlling for company characteristics that directly influence DA and company characteristics that influence the auditor choice, large auditors result in lower levels of signed DA. Results at this stage are consistent with the conclusions drawn by previous studies, that large auditors are more conservative in financial reporting. Although large auditors' clients report higher signed DA with large auditors than other companies would (positive coefficient on the large auditor inverse Mills ratio), and small auditors' clients report lower DA with small auditors than other companies would (negative coefficient on the small auditor inverse Mills ratio), large auditors result in lower DA overall than small auditors do (significant negative difference in the intercept terms).

The difference in the intercept terms in Table 4 is -0.154. This is larger than, and in the opposite direction to, the difference in intercept terms in Table 3 (+0.103).

The 0.103 (≈ 0.1) estimate from Table 3 is used to calculate the median reported DA when selectivity effects are ignored. Since the median firm lies in the 50th centile and ranked DA are uniformly distributed between 0 and 1, the median difference in DA is simply the difference in DA reported by firms in the 45th (= 0.5 - 0.05) and 55th (= 0.5 + 0.05) centiles. Companies in the 45th and 55th centiles report DA which are 1.9% and 7.3% of total assets respectively, giving a median difference of 5.4%. Therefore, companies hiring large auditors report DA which are on average 5.4% of total assets higher than those reported by companies hiring small auditors, when selectivity effects are ignored and coefficients are allowed to differ between large and small auditors' clients.

The -0.154 (≈ -0.15) estimate is used to calculate the median reported DA when selectivity effects are controlled for. The median difference in DA is now the difference in DA reported by firms in the 57½th (= 0.5 + 0.075) and 42½th (= 0.5 - 0.075) centiles. Companies in these centiles report DA which are 9.1% and 1.0% of total assets respectively, giving a median difference of -8.1%. Therefore, companies hiring large auditors report DA on average 8.1% of total assets lower than those reported by companies hiring small auditors, after taking selectivity effects into account.

6.5 Sensitivity of Results to Alternative Measures of Incentives to Meet Target Earnings

The explanatory variable SMOOTH, included in the regressions of R(DA) as a measure of incentives to meet target earnings, is the difference between pre-managed earnings and the median industry earnings in the prior year. As expected, there is a negative coefficient on R(SMOOTH) in all the R(DA) regressions reported in Tables

3 and 4, and the effect of the variable is statistically significant in all cases. However, there are several different ways in which such a variable could be constructed.

Following Peasnell et al. (2000), in this section I examine three alternative measures: an indicator (dummy) variable equal to 1 if SMOOTH is negative (and zero otherwise); an indicator (dummy) variable equal to 1 if pre-managed earnings are less than zero; and an indicator (dummy) variable equal to 1 if pre-managed earnings are less than prior-year earnings for the same company. The expected signs of the coefficients on all these alternative variables are positive.[47]

Replacing R(SMOOTH) with the first alternative does not affect the main results reported in this chapter. Large auditors result in lower signed DA when selectivity effects are taken into account. The signs of the coefficients on the inverse Mills ratios remain the same as in Table 4, and both inverse Mills ratios are statistically significant at less than the 1% level. The sign of the coefficient on the indicator variable is positive, and its effect is statistically significant at less than the 1% level, in all R(DA) regressions. R(GEAR) becomes insignificant in all regressions of DA.

Replacing R(SMOOTH) with the second alternative, similarly does not affect the main results reported in this chapter. The sign of the coefficient on this indicator variable is also positive as expected, and statistically significant at less than the 1% level in all R(DA) regressions. When selectivity effects are taken into account, the signs of the coefficients on the inverse Mills ratios remain the same as in Table 4, and both inverse Mills ratios are statistically significant at less than the 1% level. R(GEAR) remains significant as for Tables 3 and 4.

[47] All these variables are linked to the work presented in Chapter 5, concerning earnings management to meet benchmarks. The original SMOOTH variable and the first alternative mentioned here represent incentives to meet the benchmark of prior-period industry earnings. The second alternative represents incentives to avoid losses, and the third represents incentives to avoid earnings decreases.

Finally, replacing R(SMOOTH) with the third alternative, has a similar effect to using the first alternative.

The results relating to the impact of auditor size on earnings management are therefore not sensitive to alternative measures of incentives to meet earnings targets.

6.6 Partitioning Income-Increasing and Income-Decreasing DA

Because the untransformed dependent variable in the regressions of R(DA) is signed, the multivariate results, that large auditors are more conservative in financial reporting than small auditors, could be consistent with more than one effect. Either the results are driven by a constraining effect on income-increasing (positive) DA, or an encouraging effect on income-decreasing (negative) DA, or both. All would result in the observed increased conservatism in financial reporting. However, as auditors are expected to be more concerned about income-increasing DA (overstatements), the effect most consistent with prior literature is the constraint of income-increasing DA. In order to distinguish between the two effects, the models are re-estimated separately over companies with income-increasing and income-decreasing DA.

Accurate auditors would be expected to constrain both income-increasing and income-decreasing DA, resulting in lower absolute DA. This could still result in the observed auditor conservatism if the constraining effect on income-increasing DA outweighed the constraining effect on income-decreasing DA. Univariate tests show no significant difference between the absolute DA in clients of large and small auditors, but these tests do not control for the auditor choice. It is not possible to use the absolute value of DA as the dependent variable in the regression models because the likely direction of influence of the control variables becomes impossible to predict, so the models are not expected to fit well and are likely to be hard to interpret.

However, splitting the sample between income-increasing and income-decreasing DA still allows for the possibility that both types of DA are constrained.

The results of the separate estimations are reported in Tables 5-8. Table 5 reports the results of the estimations of income-increasing (positive) R(DA) without controlling for the auditor choice, and Table 6 reports the results after controlling for the auditor choice. Table 7 reports the results of the estimations of income-decreasing (negative) R(DA) without controlling for the auditor choice, and Table 8 reports the results after controlling for the auditor choice.

Table 5
Estimation Results - Without Controlling for the Auditor Choice

R(DA) – income-increasing (positive) DA only							
		Whole Sample		*Large Auditors*		*Small Auditors*	
	Predicted	*Obs* = 631		*Obs* = 497		*Obs* = 134	
R(ASSE)	+	-0.032		-0.035		-0.015	
		(0.026)		(0.028)		(0.064)	
NEX	-	-0.187	*	-0.247	*	-0.021	
		(0.091)		(0.106)		(0.174)	
R(GEAR)	+	0.074	**	0.098	**	-0.022	
		(0.024)		(0.027)		(0.052)	
R(SMOOTH)	-	-0.800	**	-0.795	**	-0.823	**
		(0.024)		(0.027)		(0.053)	
BIG	-	0.020		-		-	
		(0.018)					
CONSTANT	?	0.919	**	0.943	**	0.921	**
		(0.034)		(0.040)		(0.069)	
R^2		64.10%		63.80%		66.68%	

Notes:
Explanatory variables are defined in Table 2.
Standard errors in (parentheses). * = significant at the 5% level; ** = significant at the 1% level.

In Tables 5 and 7 there are no significant differences in the intercept terms in the regressions for clients of large and small auditors. In Table 6, after controlling for the auditor choice, the inverse Mills ratio is significant, and negative, for clients of small auditors but is not significant for clients of large auditors.

Table 6

Estimation Results - Controlling for the Auditor Choice

Model:	*Auditor Choice*		*R(DA) - positive DA only*	
Sample:	*Whole Sample*		*Large Auditors*	*Small Auditors*
	Obs = 624	*Obs* = 631	*Obs* = 497	*Obs* = 134
R(ASSE)	1.010	0.866 *	-0.081	0.154
	(0.552)	(0.390)	(0.051)	(0.105)
NEX	1.165	1.217	-0.287 *	0.064
	(0.775)	(0.768)	(0.113)	(0.177)
R(GEAR)	-	-	0.098 **	-0.035
			(0.027)	(0.052)
R(SMOOTH)	-	-	-0.797 **	-0.795 **
			(0.027)	(0.055)
R(REV)	1.135 *	1.207 **	-	-
	(0.577)	(0.403)		
R(OS)	0.340	0.427	-	-
	(0.272)	(0.264)		
LOSS	0.508 **	0.532 **	-	-
	(0.199)	(0.194)		
LAF	-0.116	-0.089	-	-
	(0.146)	(0.144)		
SAF	-0.719 **	-0.731 **	-	-
	(0.260)	(0.259)		
R(CYCLE)	0.188	-	-	-
	(0.241)			
R(CAPINT)	-0.202	-	-	-
	(0.310)			
λ^1	-	-	-0.070	-
			(0.065)	
λ^0	-	-	-	-0.130 *
				(0.064)
CONSTANT	-0.622	-0.659 **	1.003 **	0.985 **
	(0.352)	(0.256)	(0.069)	(0.075)
(pseudo) R^2	16.16%	16.02%	63.89%	67.71%

Notes:

Panel A reports the results of the estimation of the probit auditor choice model, with independent variable $Big_i = 1$ if the chosen auditor is large (i.e. Big 6) and $Big_i = 0$ otherwise.

Panel B reports the results of the separate estimations of the OLS regression model of (rank-transformed) DA for companies choosing large (i.e. Big 6) and small auditors, after controlling for the auditor choice.

Explanatory variables are defined in Table 2, with the exception of R(CYCLE) and R(CAPINT). R(CYCLE) is the rank of the operating cycle. R(CAPINT) is the rank of capital intensity.

The inverse Mills ratios are obtained from the second auditor choice model.

Standard errors in (parentheses). * = significant at the 5% level; ** = significant at the 1% level.

Table 7
Estimation Results - Without Controlling for the Auditor Choice

R(DA) – income-decreasing (negative) DA only							
		Whole Sample		*Large Auditors*		*Small Auditors*	
	Predicted	*Obs* = 406		*Obs* = 322		*Obs* = 84	
R(ASSE)	+	0.363	**	0.351	**	0.383	**
		(0.046)		(0.049)		(0.122)	
NEX	-	-0.104		0.043		-0.280	
		(0.159)		(0.214)		(0.254)	
R(GEAR)	+	-0.108	*	-0.094		-0.155	
		(0.044)		(0.049)		(0.100)	
R(SMOOTH)	-	-0.429	**	-0.451	**	-0.336	**
		(0.042)		(0.048)		(0.089)	
BIG	-	-0.022		-		-	
		(0.033)					
CONSTANT	?	0.635	**	0.578	**	0.642	**
		(0.055)		(0.078)		(0.083)	
R^2		30.89%		32.19%		26.25%	

Notes:
Explanatory variables are defined in Table 2.
Standard errors in (parentheses). * = significant at the 5% level; ** = significant at the 1% level.

This suggests that clients of small auditors report less positive DA with small auditors than other companies would. There is no evidence of a selection effect for large auditors' clients. There is no significant difference in the intercept terms, therefore large auditors do not constrain positive DA as identified by the model estimated in this chapter.

In Table 8, after controlling for the auditor choice, the inverse Mills ratio is significant, and positive, for clients of large auditors but is not significant for clients of small auditors. This suggests that clients of large auditors report less negative DA with large auditors than other companies would. There is no selection effect for clients of small auditors. For negative DA there is a significant difference in the intercept terms. As the intercept term for clients of large auditors is lower than that for clients of small auditors, and the dependent variable is negative, large auditors cause clients to report more negative DA than small auditors do.

Table 8

Estimation Results - Controlling for the Auditor Choice

Model:	*Auditor Choice*		*R(DA) – negative DA only*	
Sample:	*Whole Sample*		*Large Auditors*	*Small Auditors*
	Obs = 397	*Obs* = 406	*Obs* = 322	Obs = 84
R(ASSE)	1.514	1.571 **	0.520 **	0.448 *
	(0.787)	(0.535)	(0.087)	(0.223)
NEX	3.584 **	3.372 **	0.471	-0.158
	(0.981)	(0.965)	(0.280)	(0.433)
R(GEAR)	-	-	-0.086	-0.154
			(0.049)	(0.100)
R(SMOOTH)	-	-	-0.468 **	-0.339 **
			(0.048)	(0.090)
R(REV)	0.538	0.369	-	-
	(0.774)	(0.523)		
R(OS)	0.158	0.189	-	-
	(0.367)	(0.360)		
LOSS	0.458 *	0.432 *	-	-
	(0.224)	(0.217)		
LAF	0.309	0.297	-	-
	(0.190)	(0.189)		
SAF	-0.641	-0.728 *	-	-
	(0.376)	(0.364)		
R(CYCLE)	0.110	-	-	-
	(0.307)			
R(CAPINT)	-0.355	-	-	-
	(0.352)			
λ^1	-	-	0.306 *	-
			(0.130)	
λ^0	-	-	-	-0.047
				(0.136)
CONSTANT	-1.201 **	-1.191 **	0.272	0.645 **
	(0.385)	(0.305)	(0.151)	(0.084)
(pseudo) R^2	20.29%	19.69%	33.37%	26.36%

Notes:

Panel A reports the results of the estimation of the probit auditor choice model, with independent variable $Big_i = 1$ if the chosen auditor is large (i.e. Big 6) and $Big_i = 0$ otherwise.

Panel B reports the results of the separate estimations of the OLS regression model of (rank-transformed) negative DA for companies choosing large (i.e. Big 6) and small auditors, after controlling for the auditor choice.

Explanatory variables are defined in Table 2, with the exception of R(CYCLE) and R(CAPINT). R(CYCLE) is the rank of the operating cycle. R(CAPINT) is the rank of capital intensity.

The inverse Mills ratios are obtained from the second auditor choice model.

Standard errors in (parentheses). * = significant at the 5% level; ** = significant at the 1% level.

Therefore there is no evidence that large auditors constrain positive DA, but rather there is evidence that they encourage negative DA. Although this is still consistent with conservative financial reporting, it is at odds with expectations that there should be no auditor effect on positive DA. These results are also certainly not consistent with large auditors providing greater accuracy, as this would have resulted in the auditors constraining both types of DA.

The lack of an observed auditor effect on positive DA may have several explanations. Firstly, splitting the sample into positive and negative DA may have resulted in too small a sample size to capture any effects. Secondly, because accruals by nature reverse over time, and the sample analysed represents a single year, there may be some peculiar features of the year under analysis. There may also be additional selection effects that have not been controlled for in splitting the sample. These possible explanations may be investigated by obtaining and analysing a larger sample covering multiple years. This is left to future research. Finally, the distinction between positive and negative DA may be spurious, as auditors may not assess DA in relation to the same benchmark as used in this chapter.

Although these results are potentially at odds with prior US research, it is possible that auditors and financial reporting standards in the UK differ from the US. Perhaps the results from prior studies conducted using US data should not be expected to be borne out using UK data. Recall that Peasnell et al. (2000) also do not find results in line with US studies. In other words, there may be some genuine interpretation of these unexpected results. However, I am unable to conclude precisely as to why there should be no difference between large and small auditors in the UK regarding positive DA when there is a difference in the US and when there is a difference regarding negative DA in the UK. This too is left to future research.

7. CONCLUSIONS

After controlling for client characteristics, prior US studies find that large audit firms are associated with significantly lower reported values of DA than small audit firms. Evidence from prior UK studies is mixed. However, extant research on auditor influence on DA treats auditor choice as exogenous, while noting the possible self-selection bias that this introduces. In contrast, this chapter takes into account that auditors are not randomly assigned to audit firms. This chapter examines the effect on reported DA when auditor choice is treated as endogenous.

Univariate tests show no significant difference in DA, either signed or absolute, between clients of large and small audit firms in the UK. However, the effects of auditor selection bias on reported signed DA are found to be statistically significant in multivariate tests. The difference in signed DA reported by companies choosing large audit firms and those choosing small audit firms is negative when controlling for self-selection, and positive without (allowing for coefficient estimates to differ between the two groups). The importance of selectivity effects should not be surprising given the predictions of analytical studies of auditor choice and signalling effects. After controlling for selectivity effects, companies hiring large auditors report DA on average 8.1% of total assets lower than those reported by companies hiring small auditors. Therefore, in common with prior studies, this chapter finds some evidence that large audit firms require more conservatism in their clients' financial reporting than other audit firms.

However, in contrast to previous studies, the absolute value of DA is not found to differ significantly between clients of large and small auditors in univariate tests. Hence, although there is evidence that large auditors in the UK are more

conservative than other auditors, there is no evidence that they are more accurate than other auditors.

Furthermore, when the analysis is performed separately on positive (income-increasing) and negative (income-decreasing) DA, there is evidence that the difference in conservatism between large and small auditors is driven by large auditors encouraging more negative DA, rather than constraining positive DA. This is surprising as auditors are more likely to be sued when income is overstated, so that a rational conservative auditor should act to constrain income-increasing earnings management. Some possible reasons for these unexpected results are suggested throughout the chapter. For example, it is possible that auditors do not assess DA as positive or negative relative to the same benchmarks as used in this paper, or that the single year of data analysed is unusual in some way, or that the earnings management is performed for reasons other than pure opportunism on the part of management. Assuming that auditors can observe the motives for managerial accounting choice, they may react differently to earnings management for, say, signalling purposes, than they would to opportunistic earnings management. Because I cannot distinguish between managerial motives, auditor effects on opportunistic earnings management may be masked. As I am unable to provide a definitive explanation for the unexpected results, this is left for future research.

I also acknowledge that there are well-documented methodological problems involved in estimating DA (see e.g. Kang and Sivaramakrishnan, 1995). In particular, extant models of DA suffer from measurement error. Chapter 5 therefore explores an alternative approach to identifying earnings management.

CHAPTER 5

EARNINGS MANAGEMENT AND AUDITOR CHOICE: FURTHER EVIDENCE FROM EARNINGS DISCONTINUITIES

1. INTRODUCTION

In Chapter 4, estimates of discretionary accruals (DA) were used as a measure of earnings management to examine whether firms hiring large (Big 6) audit firms engage in less earnings management than other firms. It was shown that large audit firms are more conservative than previous studies find, in the sense that they require lower levels of DA in reported earnings. This chapter provides additional evidence to support this finding, employing evidence from earnings discontinuities around thresholds as an alternative measure of earnings management.

Although estimates of DA are widely used as a measure of earnings management (e.g. Jones, 1991; Dechow et al., 1995; Guay et al., 1996; Becker et al., 1998; Francis et al., 1999; Young, 1999; Bartov et al., 2001; Peasnell et al., 2002), they are known to be subject to some degree of measurement error and bias (Dechow et al., 1995; Guay et al., 1996; Young, 1999). For instance, the models used to estimate DA rely on an assumption of firm- or industry-specific level of non-discretionary accruals (NDA), and can therefore only classify accruals as discretionary to the extent that they deviate from that expected for the particular firm (over time) or its industry (in cross-section). For example, if all firms in a particular industry are making identical DA, a cross-sectional model of DA will not identify

those accruals as discretionary but will misclassify them as n'on-discretionary because they are common to all.

An alternative to estimating DA in order to detect earnings management, is to examine the cross-sectional distribution of earnings and earnings changes in firms (e.g. Burgstahler and Dichev, 1997; Degeorge et al., 1999). These papers note that, because earnings provide important information for investment decisions, managers have strong incentives to manage reported earnings to avoid earnings decreases and losses. Both Burgstahler and Dichev (1997) and Degeorge et al. (1999) provide theoretical models that support their assertions of managerial behaviour around earnings thresholds. Using US data, they report empirical evidence of unusually low frequencies of small losses and small decreases in earnings (compared to the prior year) coupled with unusually high frequencies of small positive incomes and small increases in earnings. In addition, Degeorge et al. also present empirical evidence showing a similar pattern of reported results around the threshold of meeting analysts' expectations.

Concentrating on net earnings in this way avoids the problems encountered in estimating DA. It also takes all accruals into account, not just the operating accruals that extant models of DA focus on. However, this method does not enable the researcher to distinguish between individual firms which are accurately reporting small positive incomes or increases in earnings (from prior year or against analysts' expectations) and those which have managed their earnings to fall within those brackets. This method is also subjective in that the researcher may choose the range of reported positive earnings or changes in earnings over which earnings management by the companies in that range is suspected. With these caveats in mind, if evidence can be found to support the existence of unusual frequencies of firms in certain

earnings brackets, then it remains interesting to analyse the characteristics of these firms as a group. In this chapter, I do so to determine whether they are (a) associated with higher or lower levels of (estimated) DA than firms not falling within these categories, and (b) more likely to be audited by large or small firms of auditors. An association with DA suggests that companies use DA to manage earnings to meet earnings thresholds, providing a link between the two branches of empirical earnings management literature. An association with audit firm size provides further evidence of differential audit firm quality in relation to earnings management.

This chapter provides evidence of a significant earnings discontinuity around the threshold of zero earnings in the UK,[48] but finds no evidence of a significant earnings discontinuity around the threshold of zero change in earnings. The threshold of meeting analysts' expectations is not examined due to lack of relevant data. For companies which fall into 'suspect' earnings brackets (reporting small positive earnings), I go on to present evidence from univariate and multivariate tests that these companies are significantly less likely to be audited by large audit firms than other companies. In addition, to support the results presented in Chapter 4, I present evidence from univariate and multivariate tests that there is a positive relationship between signed DA and earnings management to avoid losses.

The next section describes the theoretical justifications for managers' motivation to avoid reporting earnings decreases and losses, as presented in the previous literature. Section 3 describes the hypotheses and data. Section 4 presents evidence from univariate tests of the existence of earnings discontinuities, and the associations between 'suspect' companies and audit firm size, and between 'suspect' companies and signed DA. Section 5 presents further evidence of these associations,

[48] Specifically, for the sample of companies analysed in Chapter 4.

using multivariate tests to control for other important company characteristics. Section 6 concludes.

2. THEORETICAL JUSTIFICATION

Both Burgstahler and Dichev (1997) and Degeorge et al. (1999) provide theories motivating the avoidance of reporting earnings decreases and losses. Burgstahler and Dichev (hereafter BD) present both a transactions costs theory, and a prospect theory. In contrast, Degeorge et al. (hereafter DG) explore earnings management as the manager's response to compensation that depends on meeting thresholds. Following DG, I call this last the reward theory. The reward theory appears to be a special case of Fields et al.'s (2001) contracting motivation for accounting choice. In contrast, the transactions costs and prospect theories motivate why thresholds should matter in the first place.

The transactions costs theory relies on the assumptions that firms with higher earnings face lower costs in transactions with stakeholders (Cornell and Shapiro, 1987; and Bowen et al., 1995), and that stakeholders use heuristics to determine transactions terms with firms (Conlisk, 1996; DeAngelo, 1988). BD argue that these assumptions imply that a firm reporting an earnings decrease or loss bears sharply higher transactions costs than if the firm had reported an earnings increase or profit, and hence imply incentives to avoid earnings decreases and losses. BD also argue that these transactions costs are likely to be more substantial for losses than for earnings decreases, as decreases may simply represent fluctuations around some underlying expected profit level. This may explain why I find evidence of a discontinuity around the threshold of zero earnings, but not around the threshold of zero change in earnings.

The prospect theory is due to Kahneman and Tversky (1979), and postulates that decision-makers derive value from gains and losses with respect to a reference point, rather than in absolute value. BD note that zero earnings and zero change in earnings are natural reference points, and that income-increasing earnings management is therefore expected to occur around these reference points in order to influence the firm value perceived by stakeholders.

The reward theory relies upon prospect theory in that firm managers are predicted to manage earnings to influence the perceptions of less well-informed stakeholders, where stakeholders rely on earnings thresholds to provide reference points against which to form their perceptions. DH have developed this theory to motivate the assumed form of managers' compensation packages. Managers are assumed to reap payoffs positively related to earnings, which are augmented by a fixed bonus if an earnings threshold is reached. In a two-period model, DG find that when pre-managed earnings are just below the target threshold, the optimal strategy is to misreport earnings to meet the threshold, whereas when they are far below the threshold, the optimal strategy is not to do so. Moreover, when earnings are far below the threshold, managers report earnings which are lower than actually achieved. Crucially, the nature of earnings management, in particular the reversing nature of accruals over the life of a firm, means that earnings management to increase earnings in the current period reduces future earnings, and vice versa. As DG put it, firms below the earnings threshold face a trade-off between borrowing for a better today (managing current earnings upwards), and saving for a better tomorrow (managing current earnings downwards). If current earnings are sufficiently poor, little more will be lost by reporting even worse results, but this may reap future benefits by improving future earnings.

The reward theory predicts that unusually low frequencies of companies will report earnings just below the target threshold, whereas unusually high frequencies of companies will report earnings just sufficient to meet or surpass the target threshold. Section 4 presents evidence that the frequency of companies in the UK reporting small positive earnings, i.e. meeting the threshold of zero earnings, is indeed unusually high (and that of companies reporting small negative earnings is unusually low). However, no such evidence is found for the threshold of zero change in earnings.

3. HYPOTHESES AND DATA

I first wish to test whether earnings are managed to meet thresholds, by looking for discontinuities in the distribution of earnings. If there are discontinuities around thresholds, I next wish to test whether large audit firms constrain earnings management to meet thresholds. Finally, I wish to test whether companies use DA to manage earnings to meet thresholds. The first hypotheses to be tested are detailed below. The hypothesis relating DA and earnings management to meet thresholds, is detailed later in this section.

H_1: Earnings are managed to avoid losses

H_2: Earnings are managed to avoid earnings decreases

H_3: Companies which hire large audit firms are less likely to engage in earnings management to avoid losses

H_4: Companies which hire large audit firms are less likely to engage in earnings management to avoid earnings decreases

The null hypothesis for both H_1 and H_2 is that earnings are not managed; the null hypothesis for H_3 and H_4 is that there is no association between audit firm size and earnings management to avoid losses or earnings decreases respectively.

This chapter provides evidence in favour of H_1 and H_3 but I am unable to reject the null hypotheses in the case of H_2 and H_4. The theoretical justifications for H_1 and H_2 are described in Section 2. The reasoning behind H_3 and H_4 is identical to that discussed in Chapter 4, namely that large audit firms are expected to provide higher quality than small audit firms (e.g. Craswell et al., 1995; Menon and Williams, 1991; Dye, 1993; DeAngelo, 1981), and in particular that they are expected to be more conservative in relation to the level of earnings management in reported financial statements (e.g. Francis et al., 1999; and Becker et al., 1998). I find a significant negative association between audit firm size and earnings management to meet the threshold of zero earnings.

The initial data sample analysed in this chapter is that used for the analysis in Chapter 4.[49] There were 1,037 listed UK companies in the final estimation sample in Chapter 4. However, the analysis in this chapter requires additional data on earnings per share (EPS). This was collected from Datastream, but difficulties in matching this data to the sample from Chapter 4 resulted in missing EPS data for 253 companies. The final sample analysed in this chapter therefore consists of 784 companies. Descriptive statistics for these 784 companies are provided in Table 1 below.

618 companies in the sample are audited by large (Big 6) audit firms, and 166 are audited by small audit firms. DA are, on average, higher for companies audited by small audit firms, in both absolute (DA) and ranked (R(DA)) value. The mean (median) value of DA for companies with large audit firms is 0.134 (0.042) compared to 0.251 (0.060) for companies with small audit firms, whereas the mean (median) value of R(DA) for companies with large audit firms is 0.497 (0.489) compared to

[49] The sample analysed in Chapter 3 contains more companies. However, data on earnings per share (EPS), and prior-year values of accounting numbers such as receivables, necessary to calculate DA, were not collected. Because companies with clean audit reports were sampled at random from the population, it is too costly to recreate the original sample to collect this missing data.

0.511 (0.531) for companies with small audit firms. However, as in Chapter 4, these differences are not statistically significant. The observations of EPS range from a loss of 646 pence to a profit of 338 pence, whereas the changes in EPS (ΔEPS) range from a decrease of 193 pence to an increase of 1,271 pence. On average, EPS are approximately 10 pence.

Table 1
Descriptive Statistics – Main Variables of Interest

Variable	*Mean*	*Std Dev.*	*Min.*	*Median*	*Max.*
All Companies – 784					
DA	0.159	2.256	-58.549	0.046	5.628
R(DA)	0.500	0.288	0.001	0.500	0.999
EPS	10.070	41.519	-646.180	10.270	338.070
ΔEPS	3.859	52.858	-192.890	19.798	1,271.130
Large Audit Firms – 618					
DA	0.134	2.523	-58.549	0.042	5.628
R(DA)	0.497	0.288	0.001	0.489	0.999
EPS	9.917	40.600	-646.180	11.060	121.090
ΔEPS	3.724	56.176	-192.890	1.490	1,271.13
Small Audit Firms – 166					
DA	0.251	0.569	-1.416	0.060	2.433
R(DA)	0.511	0.293	0.008	0.531	0.991
EPS	10.641	44.900	-376.050	7.405	338.070
ΔEPS	4.363	38.191	-76.650	0.810	462.610

Notes:
DA are signed discretionary accruals, estimated using the cross-sectional modified Jones model as described in Chapter 4. R(DA) are rank-transformed discretionary accruals. The ranking procedure has been re-performed (since Chapter 4) for the reduced sample of 784 companies.
EPS are earnings per share (in pence); ΔEPS are the absolute change in EPS since the prior year. There are only 779 observations of ΔEPS due to missing prior year data.

Recall that the major difference between the results for earnings management and auditor choice presented in Chapter 4 and those presented in this chapter, is in the identification of earnings management. In Chapter 4, earnings management is measured as the (estimated) level of signed DA. In contrast, in this chapter, firms reporting small positive earnings (just meeting the threshold of zero earnings) or small

increases in earnings (just meeting the threshold of zero change in earnings) are postulated to be more likely to be managing earnings.

The methodology used to test H_3 and H_4 in this chapter is also simpler than that used to test the association between audit firm size and earnings management in Chapter 4, as the auditor self-selection is not controlled for here. This is because there are too few observations around the thresholds to perform a meaningful multivariate analysis if the sample is partitioned into clients of large and small audit firms.

The results in Chapter 4 are related to the work in this chapter if DA are used to manage earnings to meet thresholds. Therefore, the final hypothesis to be tested is as follows:

H_5: Companies use DA to engage in earnings management to avoid losses

The results presented in the next section show support for H_1, namely that earnings are managed to avoid losses. H_5 follows from H_1 as a result of the arguments presented in Chapter 4 as to why accruals are used to manipulate earnings. As the results presented in the next section show no support for H_2 (earnings are not managed to avoid earnings decreases), the analogue of H_5 for earnings decreases is not tested. If H_5 is true, there will be a significant positive association between signed DA and companies just meeting the threshold of zero earnings: these companies will report significantly more positive (or less negative) DA than companies falling below, or significantly above, the threshold. The null hypothesis for H_5 is that companies do not manipulate DA in order to engage in earnings management (no significant association between DA and just meeting the threshold of zero earnings).

4. METHODOLOGY AND UNIVARIATE RESULTS

This section first describes the methodology for testing whether earnings discontinuities exist around the thresholds of zero earnings and zero change in

earnings (H_1 and H_2), then presents evidence of these discontinuities. I find evidence of a discontinuity around the threshold of zero earnings, but no evidence of a discontinuity around the threshold of zero change in earnings. Secondly, this section tests whether significant associations exist between companies just meeting these thresholds, and audit firm size, using univariate tests (H_3 and H_4). A significant association is found between companies just meeting the threshold of zero earnings and audit firm size, but none is found between companies just meeting the threshold of zero change in earnings and audit firm size. Finally, this section presents evidence of an association between DA and companies meeting the zero earnings threshold, again using univariate tests (H_5).

The methodology for testing whether earnings discontinuities exist is identical to that employed by DG. Initially, I examine the distribution of EPS and ΔEPS visually by constructing a histogram. The choice of bin width for the histogram is important as aggregation or disaggregation of observations will make the distribution appear more or less smooth respectively. Following DG, a bin width of $2(IQR)n^{-1/3}$ is chosen, as recommended by Silverman (1986) and Scott (1992), where IQR is the sample interquartile range of the variable and n is the number of available observations. This formula implies a bin width of 3.552 pence for EPS, and 1.387 pence for ΔEPS. The histogram illustrating EPS is shown in Fig. 1, that for ΔEPS is shown in Fig. 2.

From Fig. 1 it appears visually that there is a bunching of the observations just above zero. This implies that there may indeed be a discontinuity in EPS at zero. To test this statistically, a test statistic τ is computed for the bins around zero, which measures the 'unusualness' of each bin in comparison to its neighbours. The calculation of the τ test statistic is described in detail in DG; because the peak of the

distribution is included in the neighbourhood of the zero earnings threshold, the elaboration A1 is followed (described in Section 4.2 later).

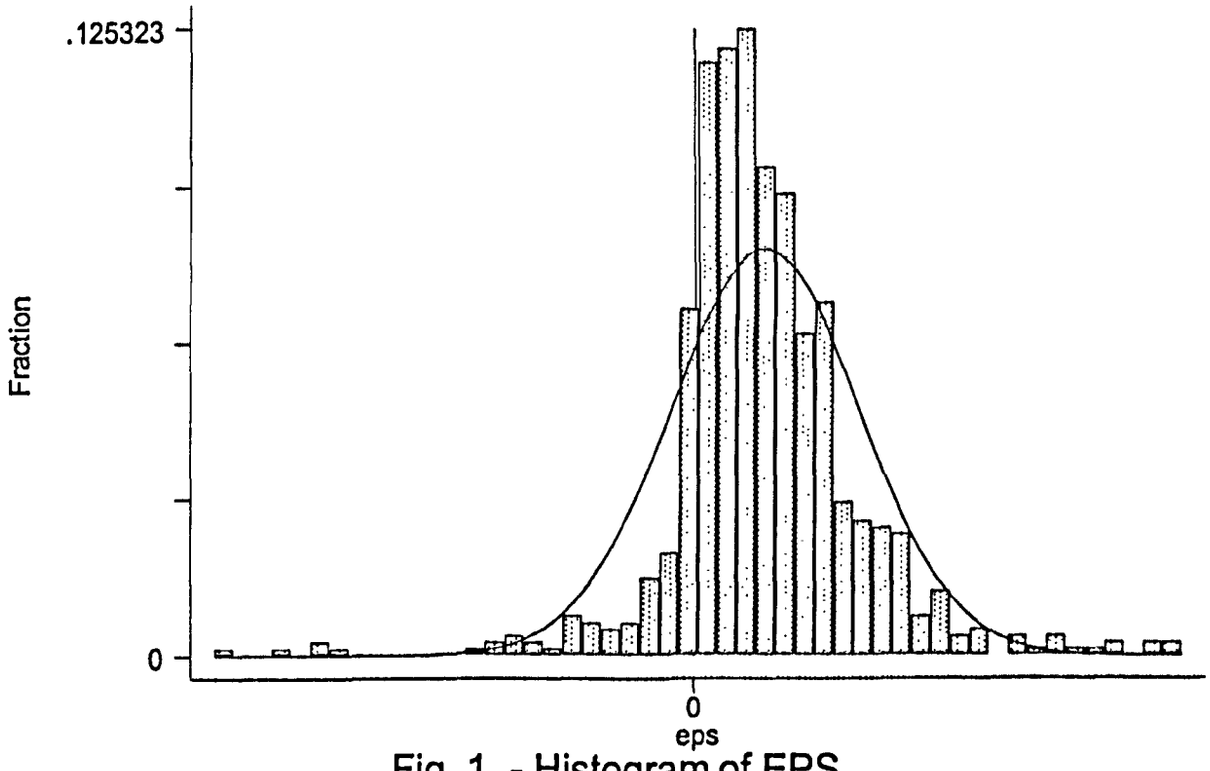

Fig. 1. - Histogram of EPS

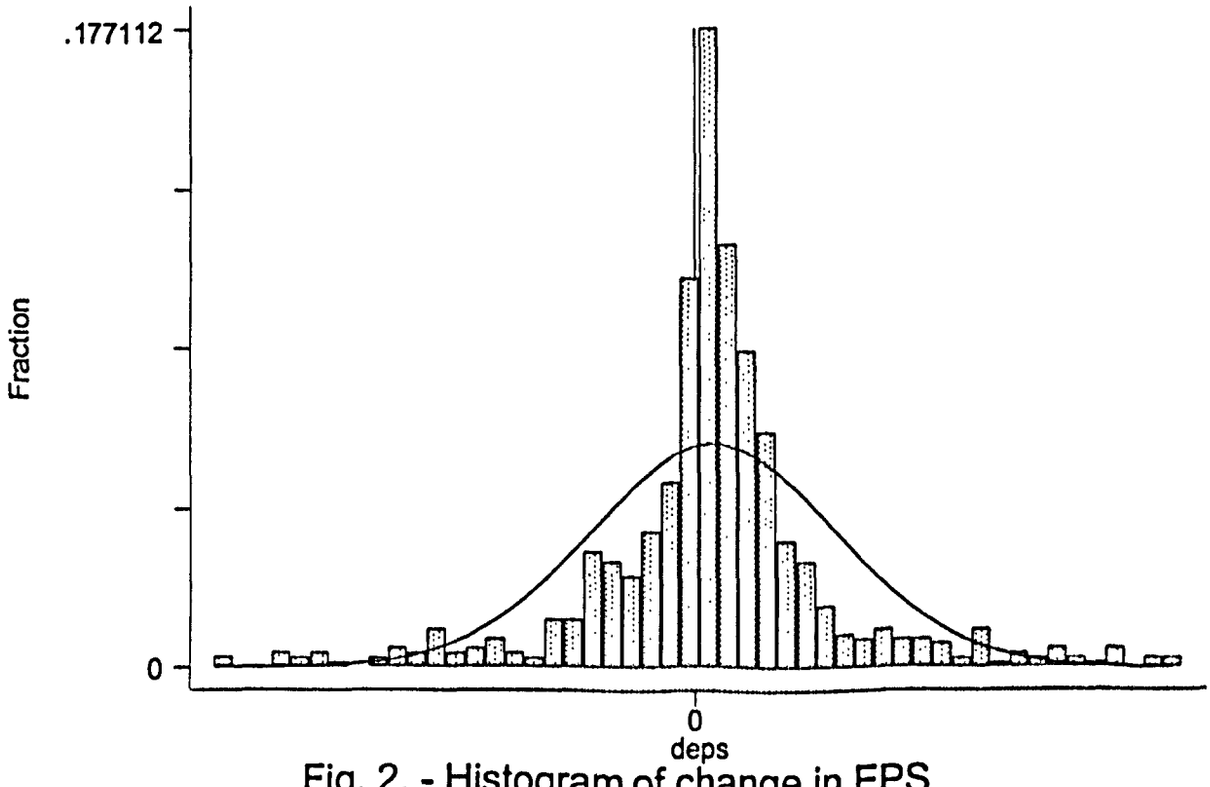

Fig. 2. - Histogram of change in EPS

From Fig. 2 it is also possible to conclude that there may be a discontinuity around the threshold of zero change in earnings, as there also appears to be an unusually high frequency of observations falling into the bin just above zero. However, this is less marked than in Fig. 1. A τ test statistic is also computed to test this statistically, again following DG. Because the conjectured discontinuity (at zero change in earnings) coincides with the peak in the distribution, elaboration A2 is followed (described in Section 4.2 later).

4.1 Testing for a Discontinuity in a Univariate Distribution

The basic test consists of computing a *t*-like test statistic τ for a particular interval of observations. This statistic can be thought of as a measure of the standard difference between the observed frequency of observations in that interval, and what would be expected if the distribution were smooth. This is estimated by reference to the observed frequencies of observations in the surrounding intervals. For illustrative purposes, Fig.s 1 and 2 show a fitted normal distribution, representing one possibility of the expected frequencies if the distributions were smooth. The τ test statistic is described in detail by DG. Its basic construction is summarised as follows:

The basic test statistic τ_n for the interval $[x_n, x_{n+1})$ of observations of the variable of interest x is:

$$\tau_n = \frac{\Delta \log(p(x_n)) - mean\{\Delta \log(p(x_i))\}}{s.d.\{\Delta \log(p(x_i))\}} \qquad (1)$$

where *mean* and *s.d.* denote the sample mean and standard deviation of {.}, calculated for $i \in R_n$, $i \neq n$. Observations corresponding to $i = n$ are excluded from the calculation of the mean and standard deviation to increase power in identifying a discontinuity at x_n. R_n is a small symmetric region around n of $2r + 1$ points (i.e. R_n =

$\{x_i : i \in (n - r, n + r)\}$. $\Delta\log(p(x_n)) = \log(p(x_n)) - \log(p(x_{n-1}))$ where $p(x_n)$ is the proportion of the observations that lie in the interval $[x_n, x_{n+1})$.

4.2 Testing for Discontinuities in EPS and ΔEPS

To test for discontinuities at zero in the distributions of EPS and ΔEPS, two elaborations of the basic test are required. These elaborations, A1 and A2, are also described by DG.

Elaboration A1 applies to the case where the symmetric neighbourhood around the conjectured discontinuity T (= zero) includes the peak P of the distribution, but where T ≠ P. This happens in the case of EPS, where T < P. In this case the region R_T is constructed asymmetrically to be the most symmetric region possible around T of $2r + 1$ points such that all the points lie at or below P. $\tau_T = \tau_0$ is then constructed as for the basic test statistic above. The test for existence of a discontinuity around zero EPS (H_1) is to compare the calculated τ_0 with 2: if τ_0 is greater than 2, then the discontinuity around zero observed by inspecting Fig. 1 is statistically significant.

The second elaboration, A2, applies to the case where the conjectured threshold T (= zero) actually coincides with the peak P of the distribution. This happens in the case of ΔEPS. The test statistic is computed similarly, but now consists of a test of whether the slope of the distribution immediately to the left of T (= P) is significantly different to the corresponding slope (adjusted for sign) immediately to the right of T. The test statistic is calculated as follows. In Eq. 1, replace $\Delta\log(p(x))$ by $\nabla p_j = \Delta\log(p(x_{T+j})) - [-1 \times \Delta\log(p(x_{T-j}))]$. The test for existence of a discontinuity around zero ΔEPS (H_2) consists of examining whether ∇p_1 is unusual with reference to ∇p_j calculated for a small neighbourhood R of T = P ($j > 1$).

If the corresponding test statistic $\tau_{T=P}$ is greater than 2, then the discontinuity around zero observed by inspecting Fig. 2 is statistically significant.

The region R about T which is examined in each case consists of 10 neighbourhood values – in the notation of Eq. (1), $r = 5$. For elaboration A1 there are 11 intervals in total, and for elaboration A2 there are 5 values of ∇p_j calculated, including ∇p_1. Each interval is 3.552 pence long for EPS, and 1.387 pence long for ΔEPS.

4.3 Results of Tests for Discontinuities in EPS and ΔEPS (H_1 and H_2)

For the threshold of T = zero earnings (testing H_1), $\tau_0 = 2.521$. For the threshold of T = zero change in earnings (testing H_2), $\tau_{T=P} = -0.074$.

I conclude that there is a discontinuity around the threshold of zero earnings (H_1), but there is no discontinuity around zero change in earnings. H_2 is rejected. Therefore, earnings are managed to avoid losses in the UK, but they are not managed to avoid earnings decreases.

This result differs from those of BD and DG, as both of these studies do find evidence of earnings management to avoid earnings decreases. However, this is consistent with BD's transactions cost theory, which suggests that the threshold of zero earnings may be more important than that of zero change in earnings.

4.4 The Relationship Between Auditor Size and Earnings Management to Meet Earnings Thresholds (H_3 and H_4)

In order to determine whether there is a significant association between audit firm size and earnings management to meet either the threshold of zero earnings (H_3) or zero change in earnings (H_4), it is first necessary to identify those companies which are suspected of engaging in such earnings management. These 'suspect' companies are defined as those with EPS (ΔEPS) in the region of [0, 5) pence, in other words,

meeting or exceeding the threshold of zero earnings (change in earnings) by no more than 5 pence.[50]

There are 166 companies in the sample hiring small audit firms, and 618 companies hiring large audit firms. 30.1% of the companies hiring small audit firms are 'suspect' in terms of just meeting the threshold of zero earnings, compared to only 16.3% of companies hiring large audit firms. All other companies are classed as 'non-suspect'. The difference in the proportion of companies hiring different audit firm sizes which are 'suspect' is statistically significant at less than the 0.1% level using a one-tailed t-test. Hence it is not possible to reject the null hypothesis for H_3. On the basis of this univariate test, companies which hire large audit firms are indeed less likely to engage in earnings management to avoid losses.

Because of missing prior year data for EPS, there are 165 companies in the sample hiring small audit firms, and 614 hiring large audit firms, when examining ΔEPS. 43.6% of the companies hiring small audit firms are 'suspect' in terms of just meeting the threshold of zero change in earnings, very similar to the 43.2% of companies hiring large audit firms. This difference is not statistically significant, and the null hypothesis for H_4 cannot be rejected. As no evidence was found to support the existence of earnings management to avoid earnings decreases (H_2), it is not surprising that there is no association found between auditor size and meeting the threshold of zero change in earnings.

4.5 The Relationship Between DA and Earnings Management to Meet Earnings Thresholds (H_5)

If the arguments presented in Chapter 4 are correct with respect to earnings management arising as a result of DA, one would expect to see a relationship between

[50] In additional tests not reported here, qualitatively identical results were obtained if 'suspect' companies were identified as those with EPS (ΔEPS) in regions [0, 2), [0, 3), [0, 4), and [0, 10) pence.

earnings management to meet earnings thresholds, and DA. Because there is no evidence that earnings are managed to avoid earnings decreases (H_2), there is not expected to be an association between companies just meeting the threshold of zero change in earnings, and DA. However, because there is evidence that earnings are managed to avoid losses (H_1), there is expected to be a positive association between companies just meeting the threshold of zero earnings, and signed DA. In particular, companies which are 'suspect' are expected to make more income-increasing DA (although the same effect may occur through less income-decreasing DA).

DA are estimated using the modified cross-sectional Jones model (described in Chapter 4). The estimated DA calculated in Chapter 4 are used.

There are 151 'suspect' companies just meeting the threshold of zero earnings, and 633 'non-suspect' companies. The mean signed DA for companies in the 'suspect' group is 0.310, compared to 0.123 for companies in the 'non-suspect' group. This difference is not statistically significant using a t-test. However, because the distribution of DA is non-normal (see Chapter 4), a t-test may not be appropriate in this case. The mean absolute value of DA is 0.439 for the 'suspect' group, and 0.470 for the 'non-suspect' group. This difference is also statistically insignificant using a t-test.

As an alternative, the median signed DA for each group of companies are compared. The median signed DA for companies in the 'suspect' group is 0.102, compared to 0.036 for companies in the 'non-suspect' group. The Pearson χ^2 coefficient is 7.882, significant at less than the 1% level. Therefore, there is evidence that companies use DA to manage earnings to avoid losses (supporting H_5). Ranking the signed DA before using a t-test to compare the means, also supports this finding. The mean ranked DA (R(DA)) for 'suspect' companies is 0.541, whereas for 'non-

suspect' companies it is 0.493. This difference is statistically significant at less than the 5% level, using a one-tailed test.

5. MULTIVARIATE TESTS

5.1 Motivation, Model and Descriptive Statistics

The work reported in this Chapter does not control for the self-selection of audit firms by companies. This is difficult to do because there are too few observations around the thresholds to run a meaningful multivariate analysis of membership of the 'suspect' category when the sample is further partitioned into clients of large and small audit firms. However, it is possible that the results in Section 4.4 are being driven by a selection effect in that small companies may be simultaneously more likely to select small audit firms and more likely to be at or close to the zero earnings threshold. In Chapters 2 and 4, large companies were shown to be more likely to hire large audit firms than small audit firms. Furthermore, in Chapters 2 and 4 companies making losses were also shown to be more likely to hire large audit firms. This relationship between auditor choice and profitability may also be driving the univariate results, as 'suspect' companies, by definition, do not make losses in the current year.

In order to address these issues, I estimate the following probit model of membership of the 'suspect' group:

$$SUSPECT_i^* = \alpha_0 + \alpha_1 BIG_i + \alpha_2 R(DA)_i + \alpha_3 EPS_i + \alpha_4 R(ASSE)_i + \alpha_5 R(GEAR)_i + \varepsilon_i \quad (2)$$

Where I observe $SUSPECT_i = 1$ if $SUSPECT_i^* > 0$, and $SUSPECT_i = 0$ otherwise. BIG_i is a dummy variable equal to 1 if the audit firm hired by company *i* is large (Big 6), and 0 otherwise. EPS_i is the earnings per share reported by company *i*, R(DA) is the rank of the signed discretionary accruals of company *i*, and $R(ASSE)_i$ is the rank

of total assets of company *i*. I also include $R(GEAR)_i$, the rank of financial gearing, to control for the influence of gearing on earnings management, as in Chapter 4.

Table 2
Descriptive Statistics – Multivariate Test Variables

Variable	*Mean*	*Std Dev.*	*Min.*	*Median*	*Max.*
All Companies – 784					
SUSPECT	0.193	0.395	0	0	1
BIG	0.788	0.409	0	1	1
DA	0.159	2.256	-58.549	0.046	5.628
R(DA)	0.500	0.288	0.001	0.500	0.999
EPS	10.070	41.519	-646.180	10.270	338.070
ASSE	311,219	1.701M	-13,579	33,844	42.4M
R(ASSE)	0.500	0.288	0.001	0.500	0.999
GEAR	29.190	58.510	-1,021	26.250	770.320
R(GEAR)	0.500	0.288	0.001	0.500	0.999
Suspect Companies – 151					
BIG	0.669	0.472	0	1	1
DA	0.310	0.776	-1.829	0.102	5.628
R(DA)	0.541	0.283	0.004	0.589	0.999
EPS	2.341	1.515	0	2.180	4.790
ASSE	86,650	259,880	-399.000	19,075	2.53M
R(ASSE)	0.384	0.260	0.002	0.369	0.949
GEAR	33.911	35.763	-179.530	32.230	194.730
R(GEAR)	0.548	0.306	0.004	0.605	0.991
Non-Suspect – 633					
BIG	0.817	0.387	0	1	1
DA	0.123	2.481	-58.549	0.036	3.509
R(DA)	0.493	0.286	0.001	0.482	0.996
EPS	11.914	46.016	-646.180	13.460	338.070
ASSE	364,789	1.886M	-13,579	39,681	42.4M
R(ASSE)	0.536	0.260	0.001	0.540	0.995
GEAR	28.063	62.699	-1,021	24.820	770.320
R(GEAR)	0.489	0.283	0.001	0.478	0.999

Notes:
DA are signed discretionary accruals, estimated using the cross-sectional modified Jones model as described in Chapter 4. R(DA) are rank-transformed discretionary accruals.
EPS are earnings per share (in pence); ASSE are total assets, in £'000s. GEAR is financial gearing, defined in Chapter 4. R(ASSE) and R(GEAR) are rank-transformed total assets and gearing, respectively.
The ranking procedure has been re-performed (since Chapter 4) for the reduced sample of 784 companies.

Descriptive statistics for these variables are reported in Table 2. The signed DA, ASSE and GEAR variables are rank-transformed as the distributions of the

untransformed variables are skewed. As in Section 4, 'Suspect' companies are, on average, more likely to hire small audit firms and have greater values of signed DA. They also have lower EPS, smaller ASSE and higher GEAR.

The estimation results are presented and discussed in the next Section.

5.2 Results and Discussion

The results of the estimation of Eq. 2 are reported in Table 3.

Table 3
Probit Model of Membership of 'Suspect' Group

Variable		
BIG	-0.265	*
	(0.129)	
EPS	-0.002	
	(0.001)	
R(DA)	0.372	*
	(0.189)	
R(ASSE)	-1.159	**
	(0.209)	
R(GEAR)	0.623	**
	(0.191)	
CONSTANT	-0.635	**
	(0.162)	

Notes:
The dependent variable SUSPECT is a dummy variable equal to 1 if the company is in the 'suspect' group (reporting EPS in the [0,5) pence range), and 0 otherwise.
BIG is a dummy variable equal to 1 if the company hires a large audit firm, and 0 otherwise.
EPS is earnings per share, in pence.
DA are signed discretionary accruals, estimated using the cross-sectional modified Jones model as described in Chapter 4. R(DA) are rank-transformed discretionary accruals.
ASSE are total assets, in £'000s. GEAR is financial gearing, defined in Chapter 4. R(ASSE) and R(GEAR) are rank-transformed total assets and gearing, respectively. The ranking procedure has been re-performed (since Chapter 4) for the reduced sample of 784 companies.
Standard errors in (parentheses).
** = significant at the 1% level. * = significant at the 5% level.
The model does not fit very well, having a pseudo R^2 of 8.14%.

After controlling for R(ASSE), EPS and R(GEAR), both BIG and R(DA) remain significantly associated with earnings management to avoid losses, SUSPECT.

Clients of large audit firms are less likely to engage in earnings management to avoid losses, and companies engaging in earnings management have higher values of signed DA. This is consistent with the univariate results reported in Sections 4.4 and 4.5.

R(ASSE) and R(GEAR) are also significantly associated with SUSPECT, but EPS is not. Large companies are less likely to engage in earnings management to avoid losses. Companies with high gearing are, as found in chapter 4, more likely to engage in earnings management to avoid losses.

6. CONCLUSION

By testing for the existence of discontinuities around zero in the distribution of EPS and ΔEPS respectively, this chapter has shown that earnings in the UK are managed to avoid losses, but they are not managed to avoid earnings decreases.

This chapter has also provided evidence that companies use DA, as estimated using a cross-sectional modified Jones model, to manage earnings to avoid losses. Evidence is provided by both univariate and multivariate tests. This supports the methodology of Chapter 4, in which DA are used as a measure of earnings management in order to assess the effect of auditor choice upon earnings management.

Further support for the findings of Chapter 4, that large (Big 6) audit firms are more conservative in terms of the level of earnings management in their clients' financial statements, is also provided in this chapter. Univariate and multivariate tests show that companies which hire large (Big 6) audit firms are less likely to engage in earnings management to avoid losses than companies which hire small audit firms. However, no attempt has been made in this chapter to control for auditor self-selection, because there are too few 'suspect' observations to perform rigorous tests in the manner of Chapters 2 and 4.

CHAPTER 6

CONCLUSIONS AND DIRECTIONS FOR FURTHER RESEARCH

1. SUMMARY

During the time that I have been working on this thesis, the worlds of auditing and financial reporting have been shaken by a series of scandals spawned by the bankruptcy of Enron, the US 'energy giant'. One of the Big 5 accounting firms, Enron auditor Arthur Andersen, has collapsed having been found guilty of obstructing justice by shredding documents. Even the White House has been implicated for its links between the Bush administration and Enron, while 'cash for access' claims have been made against the Labour government in the UK. Corporate scandals involving auditors are not new – consider BCCI, Polly Peck and the like – but important lessons do not appear to have been learned. Against a background of faltering public confidence, auditors are increasingly being called to account.

The case of Enron is particularly illuminating because of Arthur Andersen's role. Enron's finance director Andrew Farstow has been accused of fraud in relation to the web of 'special purpose entities' apparently created to help manage the company's earnings and keep liabilities off the consolidated balance sheet. Arthur Andersen advised Enron on setting up these special purpose entities and charged significant fees for related work, and yet despite their knowledge and understanding of the features of the entities failed to express their private concerns in their audit report (Gwilliam, 2002). The audit in Enron's case is clearly flawed – it is hard to believe that the auditors did not discover the fraud, they simply chose to ignore it.

Until the resignation of then Enron chief executive Jeff Skilling in August 2001, which turned the sliding share price into a plummeting fall, there was little outside clue of the difficulties that the business faced.

In an environment where such a spectacular collapse can occur seemingly without warning, and where an auditor plays such an important role in the very means by which a company's accounts obscure economic reality, questions over the purpose and meaning of financial audits become paramount. Without an extreme event such as bankruptcy, how can the 'man in the street' judge the quality of the auditor's work? What is reasonable to expect from the auditor? What do we understand from the audit report, and what comfort can we gain?

This thesis explores these questions in relation to audit quality in the UK. In the absence of objective yardsticks of audit quality, I examine whether large (Big 6) audit firms provide higher quality than other audit firms. This is a challenging area as audit quality is both multidimensional and impossible to observe directly. First, I confirm the existence of large audit firm fee premiums in the UK. Fee premiums are often cited as evidence that large audit firms provide higher quality. Second, I identify some determinants of modified audit reports in the UK and test whether large audit firms are more likely to issue audit report modifications. Taking earnings management as an alternate measure of audit quality, I then study the impact of audit firm size on earnings management in corporate financial statements.

I find that UK companies hiring large audit firms have lower signed discretionary accruals (DA). By identifying discontinuities around earnings thresholds, I also show that earnings management to avoid losses is positively related to signed DA. Finally, I find that UK companies hiring large audit firms are less likely to engage in earnings management to avoid losses.

The following sections summarise the difficulties encountered in each piece of work, and suggest ways in which to extend or improve the research. The final section outlines directions for future research.

2. AUDITOR CHOICE AND THE LARGE AUDIT FIRM FEE PREMIUM

The first chapter of research in the thesis confirms the existence of the large audit firm fee premium in the UK. Prior audit fee research does not allow for the endogeneity of the audit firm choice when assessing the audit fees paid by client companies. In contrast, Chapter 2, 'The Large Audit Firm Fee Premium: A Case of Selectivity Bias?', employs a two-stage Heckman-type selection model in order to control for audit firm choice. This is the first time that such an approach has been used when examining the large audit firm fee premium.[51]

This chapter shows that the premium estimated by prior studies is biased downwards because large audit firms' clients pay lower fees than randomly selected clients would pay to large audit firms (they are 'higher quality'). High quality companies are more likely to hire (and be accepted by) high quality audit firms. Such companies may require less audit work after controlling for size, complexity and inherent risk. For example, better quality accounting systems or high management integrity may mean that their accounts are less likely to contain misstatements. In this case, the premium estimated by prior studies (e.g. Pong and Whittington, 1994; Craswell et al., 1995) will be biased downwards. Large auditors benefit from advantageous selection bias whereas small auditors suffer from adverse selection bias.

Although company size and complexity are of primary importance in determining audit firm choice, affiliations between audit firms and influential directors are also important. Companies hire large (small) audit firms more often

[51] This chapter is joint work with Clive Lennox, and is published in the Journal of Accounting Auditing and Finance (2002).

when directors disclose affiliations with large (small) audit firms. Chapter 2 shows that the effects of audit firm selection on audit fees are statistically and economically significant. A task for future research is to estimate the effects of selectivity on audit fees in countries where large audit firm premiums have not yet been found.

3. UNDERSTANDING AND PREDICTING AUDIT REPORTS

Chapter 1 introduces the thesis, and reviews the academic literature generally relevant to the work. In this chapter I also argue that understanding the factors which lead auditors to issue different types of audit reports will inform discussions of audit quality and the information content of these reports. This is addressed by Chapter 3 'Does One Size Fit All? Evidence from a Multinomial Logit Model for Predicting Audit Reports'.

Chapter 3 uses a multinomial logit model to examine the determinants of three different audit report outcomes on a large sample of diverse UK companies.[52] Prior studies of audit reporting in the UK are limited by the type of company, or the type of audit report modification, studied. In contrast, I study both public (listed and non-listed) and private companies, and both going-concern related and non going-concern related audit report modifications.

Chapter 3 demonstrates the importance of persistence in audit reporting. Prior year audit reports are significantly and positively related to current year audit reports. Furthermore, when compared to a naïve model based solely on prior year audit reports, the multinomial logit model has little effect on prediction error costs. There is also little improvement gained by using the multinomial logit model in comparison to a standard dichotomous logit model. This is despite variables such as company size having opposite effects on going-concern related and non going-concern related audit

[52] A paper based on this work is forthcoming in the Journal of Business Finance and Accounting (2003).

modifications. Arguably, this persistence reduces the information content of audit reports as they can only carry incremental information to the extent that they are unpredictable. This has policy implications, as attempts to increase the informativeness of audit reports should include measures to discourage persistence.

The main focus of the thesis is to examine whether large audit firms provide higher quality than other audit firms. The frequency of audit report modification represents one possible metric of audit quality. However, Chapter 3 provides no evidence that large audit firms are more likely to issue audit report modifications than other audit firms. In fact, audit firm size is shown to be significantly negatively associated with non going-concern modifications. This may be due to selection bias – high quality companies are expected to be simultaneously more likely to hire large audit firms, and less likely to require audit modifications for disagreements or limitations on scope (e.g. because they have high quality accounting systems or managers who are less likely to engage in misleading financial reporting).

To control for the effects of self-selection of audit firms by companies, it would be necessary to employ a selection model similar to that employed in Chapters 2 and 4, modelling the auditor choice. But because the sample used in Chapter 3 includes non-listed companies, data on directors' affiliations with audit firms, which is important for the auditor choice model, is not available. Hence the auditor choice is not controlled for in Chapter 3. This is left to future research.

4. AUDIT FIRM CHOICE AND DISCRETIONARY ACCRUALS

Chapter 4 takes account of the influence of audit firm size on the content of published financial statements. This influence may be direct or indirect: direct because high quality audit firms are more likely to discover misstatements and require their clients to correct them, and indirect because high quality companies are simultaneously both

more likely to hire large audit firms, and less likely to make misstatements in the first place. Accordingly, I explore whether the clients of large audit firms engage in less income-increasing earnings management activity than the clients of small audit firms, where the level of earnings management is measured as signed discretionary accruals (DA). I extend the previous literature by taking into account that clients are not randomly assigned to audit firms, in a similar manner to Chapter 2. This has not been done previously, although prior research notes the possibility that companies which hire large audit firms share characteristics which are also associated with lower (Becker et al., 1998) or with higher (Francis et al., 1999) levels of reported DA.

I present evidence that large audit firms are more conservative with respect to their clients' financial reporting, as they require lower values of signed DA. However, in contrast to prior US studies, my results are not consistent with increased accuracy in financial reporting, as there is no evidence that large audit firms are associated with lower absolute values of DA. When testing differences in absolute DA it is not possible to control for the auditor selection, which may explain this difference. Alternately, there may be a genuine difference between US and UK audit firms which I cannot explain. Finally, I find no evidence that large audit firms constrain positive signed DA, rather that they encourage negative signed DA. This is contrary to expectations. If large audit firms are more conservative, one would expect them to constrain positive (income increasing) DA, as audit firms are more likely to be sued for overstatements of earnings than for understatements.

There are at least four possible explanations for these unexpected results. Firstly, because discretionary accruals by their very nature reverse over time, it is possible that the single year analysed in Chapter 4 is unusual in some way. To

determine whether this is so, further years of data can be collected and the analysis can be re-performed on the pooled data set, and on further individual years.

Secondly, it is possible that this result is due to the complicated nature of the relationship between audit firm choice and earnings management. If earnings management is always opportunistic (for example, motivated by management bonuses based on company performance), a high quality audit firm would be expected to constrain earnings management. Therefore, if large audit firms are high quality, one would expect to see that companies hiring large audit firms engage in less earnings management, whether income-increasing or income-decreasing, than they would otherwise do. Prior research would therefore overestimate the influence of the large audit firm. However, earnings management may not always be (purely) opportunistic. For example, it may be undertaken to signal managers' private information to shareholders or other stakeholders.

If earnings management is undertaken to signal information, then high quality companies hiring large audit firms may simultaneously engage in more earnings management. In particular, high quality companies may make positive DA because they have favourable private information. In this case, prior research would underestimate the influence of the large audit firm by failing to control for the auditor selection bias.

However, it is hard to distinguish motives for earnings management simply by looking at DA. Different motives may have identical effects, particularly if managerial compensation packages have aligned the interests of management and shareholders. I do not find results consistent with any single source of motivation for earnings management. I cannot claim to fully distinguish different motives for earnings management in Chapter 4. Because multiple, and conflicting, motives may

occur, useful insights may be gained by analysing the problem using a theoretical framework. The problems faced by managers and auditors when considering earnings management under conflicting motives may be simplified in this way. If clear predictions of behaviour can then be obtained, it may be possible to develop empirical methodology to test these predictions. Further investigation of these two possibilities is left to future research.

The third possible explanation for the unexpected results is that the models used to estimate DA may themselves be flawed. For example, such models have been found to suffer from measurement error. Finally, the distinction between positive and negative DA may itself be spurious, as auditors are unlikely to use exactly the same benchmark to identify income-increasing and income-decreasing adjustments as employed in this chapter.

An alternative approach to identifying earnings management, identifying discontinuities in reported earnings, is adopted in Chapter 5. The relationships between audit firm size and earnings discontinuities, and between earnings discontinuities and DA, are examined, and are summarised in the next section.

5. AUDIT FIRM CHOICE AND EARNINGS DISCONTINUITIES

In Chapter 4, earnings management was measured with respect to DA. In Chapter 5, 'Earnings Management and Auditor Choice: Further Evidence from Earnings Discontinuities', earnings management is identified by the presence of a discontinuity in the univariate distribution of earnings per share, following Burgstahler and Dichev, (1997), and Degeorge et al. (1999). When a discontinuity occurs, 'too few' firms report earnings per share just below the threshold, whereas 'too many' report earnings per share just above the threshold.

Because earnings provide important information for investment decisions, managers have strong incentives to manage reported earnings to avoid earnings decreases and losses. In other words, firms are more likely to report small positive earnings or changes in earnings than they are to report small negative earnings or changes in earnings. In addition, Degeorge et al. report empirical evidence showing a similar pattern of reported results around the threshold of meeting analysts' expectations.

I present evidence of a discontinuity around the threshold of zero earnings per share in the UK. In contrast to prior research using US data, I find no evidence of a discontinuity around the threshold of zero change in earnings. I cannot test whether there is a discontinuity around the threshold of meeting analysts' expectations, as I do not have data on analysts' forecasts. This is left to future research. I conclude that UK companies may manage earnings to avoid losses, but not to avoid earnings decreases.

Secondly, in both univariate and multivariate tests, I show that firms reporting 'suspect' values of earnings per share (just above the zero threshold) are significantly less likely to be audited by large audit firms. I also present univariate and multivariate evidence that 'suspect' firms are positively associated with signed DA, as calculated in Chapter 4. Therefore, companies use DA to manage earnings upwards to avoid losses. I claim that this supports the assertion in Chapter 4 that discretionary accruals are used to manage earnings.

6. DIRECTIONS FOR FUTURE RESEARCH

As noted in the summaries above, questions remain relating to the work presented in this thesis. Extensions and improvements are outlined below, they are left to future research.

In Chapter 3, I find a negative relationship between audit firm size and non going-concern related audit report modifications. Further work is required to determine whether this negative relationship is a result of the endogenous audit firm choice or whether it represents a genuine (although unexpected) quality differential. There are two ways in which this could be done. The obstacle to estimating a two-stage Heckman-type selection model, as used in Chapters 2 and 4, is the lack of director affiliation data for non-listed companies. This data is publicly available for listed companies but not for other companies. Either a larger sample of listed companies should be collected, covering several years to obtain sufficient numbers of modified audit reports, or a sample of non-listed companies already included in the analysis should be written to asking them to provide the information. The former is cheaper, and more practical. Response rates to written requests for information may be poor, particularly as some of the companies may have become bankrupt or the directors may have left.

The work in Chapter 3 could also be extended by distinguishing between different kinds of non going-concern related audit reports in the multinomial model of audit reporting. To do this best, copies of modified audit reports would be obtained from financial statements held at Companies House, and read, to improve classification.

Chapter 2 shows that the effects of auditor selection on audit fees in the UK are significant. This may explain why large audit firm fee premiums have not yet been identified in some countries. Therefore, one line of future research is to estimate the effects of selectivity on audit fees in countries where large audit firm premiums have not yet been found.

Chapter 4 reports a negative relationship between signed DA and audit firm size. This is expected if large audit firms provide higher quality and their clients engage in less income-increasing earnings management, as audit firms are more likely to be sued for overstatements of income than for understatements, and large audit firms have more wealth at risk from litigation. However, Chapter 4 shows that the observed negative relationship is driven not by a negative association between large audit firms and income-increasing DA, but by an association between large audit firms and income-decreasing DA. Large audit firms require significantly more negative discretionary accruals but no less positive discretionary accruals.

This finding is contrary to expectations and cannot be understood without further analysis, although it is consistent with other UK research (e.g. Peasnell et al., 2000). One possibility is that the sample analysed in Chapter 4 comes from an unrepresentative year, because it consists of a single year of cross-sectional data, but accruals reverse over time. Therefore it is important to test whether this result also holds for a pooled sample consisting of more than one year of data.

If the results of Chapter 4 regarding negative and positive discretionary accruals also hold for a pooled sample of years, then it is possible that the existing theory is incomplete. The link between earnings management and audit quality is likely to be complex as earnings management may be entered into by management for both opportunistic and non-opportunistic (e.g. information signalling) purposes. Untangling the relationship between audit firm choice and earnings management is unlikely to be straightforward, so useful insights may be gained by theoretical analysis which abstracts away from real-world complications. In contrast, empirical results may be consistent with, or driven by, more than one motivation for earnings management, but these motivations are unobserved or unverifiable. Failing to

concentrate on opportunistic earnings management alone may also explain my unexpected results.

Other possible explanations for the results in Chapter 4 concern the size of the sample analysed, and measurement of earnings management using DA. First, extending the sample to include more years of data, as proposed above, may increase the likelihood of audit firm effects being detected; otherwise, particularly when the sample is partitioned, audit firm effects may simply be too small to be identified. Second, extant models of DA, including the cross-sectional Jones model used in Chapter 4, are known to suffer from problems such as measurement error. Chapter 5 goes some way to addressing this problem by identifying earnings management using earnings discontinuities. An additional, alternative approach to explore in future work could be that proposed by Kang and Sivaramakrishnan (1995), using instrumental variables.

This thesis has amply illustrated Chapter 1's assertion that analysing audit quality is not straightforward. Data is extremely limited and care must be taken to consider the self-selection bias resulting from companies' audit firm choices. Quality may be defined in different ways, and measurements tend to be subjective, consisting of comparisons between different audit firms, rather than objective. Cases such as the recent collapse of Enron bring audit firms (and the accounting profession as a whole) into widespread public criticism. Regulatory reforms that seek to address the problems brought to light include the auditor independence rules now enshrined in US law by the Sarbanes-Oxley Act, and proposals which include mandatory audit staff rotation in the UK. However, the success of these policies will be hard to judge given the complex nature of the issues involved.

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Appendix A

RE-ESTIMATION OF CHAPTER 2 RESULTS

The inclusion of the 'public' and 'list' explanatory indicator variables in the models of Chapter 2 has shown that listing or public/private status does not significantly affect the likelihood of audit report modification. However, it is possible that the determinants of audit report modifications may differ between company types. For example, public (listed) companies tend to have different financial structures to private companies, so that loan finance may become more or less material to the accounts.

In order to examine whether the determinants of audit modifications differed between company types, the models reported in this chapter were additionally estimated separately over public and private companies. The population of listed companies in the data is relatively small (288 out of 6,978 in the estimation sample, and 86 out of 2,326 in the holdout sample), hence a public/private distinction was thought to be more appropriate to this study than a listed/non-listed distinction.

The 'standard' dichotomous logit and the multinomial logit models are estimated twice in this Appendix. The first estimation is over private companies only, and the second over public companies only. The results of these estimations are reported in Tables A1 - A6 below. Explanatory and dependent variables and descriptive statistics for the samples are as reported in Tables 2, 3 and 4 in the body of the chapter, with the exception of the 'public' indicator variable, which is excluded entirely. With the further exception of the listed company dummy variable, which is excluded from the private company estimations, all other explanatory variables are included in all models.

Table A1 reports the results of the estimation of the 'standard' dichotomous logit model over the estimation sample. Table A2 reports the results of the multinomial model estimated over the estimation sample. Table A3 reports the degree of persistence in audit reporting in the estimation sample, separately for public and private companies. This is necessary to determine the predicted outcomes for the naïve strategy.

Tables A4a and A4b report the estimated probabilities of non going-concern and going-concern related audit modifications respectively, in both the estimation and the holdout samples. Tables A5a and A5b report the predictive power of the multinomial logit model in terms of Type I and Type II error rates and the percentages of audit report types correctly predicted, for the estimation and holdout samples respectively. Finally, Table A6 reports the relative misclassification costs, in the holdout sample, of the multinomial model in comparison with the naïve strategy and the standard dichotomous logit model.

The results of the estimation of the standard logit model are reported in Table A1. The audit lag and lagged audit report variables are all significant for both company types, and have positive coefficients as expected. In addition, company size and subsidiary status are significant in explaining audit reporting in private companies, whereas listing is significant in explaining audit reporting in public companies. Large private companies and private companies which are not subsidiaries, are more likely to receive modified audit reports. Listed public companies are less likely to receive modified audit reports.

Table A1

Estimation Results for Dichotomous Logit Model of Audit Reporting

	Private companies		*Public companies*	
Variable	*Any modification*		*Any modification*	
ln(ASSE)	0.118	*	-0.044	
	(0.053)		(0.095)	
SUBSID	-0.282	*	-0.317	
	(0.143)		(0.453)	
QUICK	-0.063		0.063	
	(0.062)		(0.100)	
GEAR	0.014		0.039	
	(0.011)		(0.022)	
LOSS	0.109		0.773	
	(0.192)		(0.461)	
CONT	0.018	*	-0.054	
	(0.008)		(1.341)	
BIG	-0.261		0.017	
	(0.152)		(0.464)	
ln(AF)	-0.097		0.311	
	(0.086)		(0.200)	
ln(NAF)	-0.037		-0.187	
	(0.072)		(0.126)	
LAG	0.002	**	0.003	**
	(0.001)		(0.001)	
GC	4.159	**	5.389	**
	(0.234)		(0.702)	
NGC	5.203	**	5.052	**
	(0.164)		(0.493)	
DIV	-0.219		0.348	
	(0.136)		(0.324)	
LIST	-		-1.262	*
			(0.623)	
constant	-5.626	**	-5.771	**
	(0.446)		(0.883)	
Observations	6,218		760	
	$F(13, 6205) = 103.59$**		$F(14,726) = 15.26$**	
Pseudo R^2	0.4632		0.4066	

Notes:

* = statistically significant at the 5% level.

** = statistically significant at the 1% level.

Standard errors are reported in (parentheses).

Coefficients are relative to the base choice of clean report.

Dependent variable is coded 0 if the audit report is clean, 1 otherwise.. Explanatory variables are defined in Table 2.

The results of the estimation of the multinomial model of audit reporting on the estimation sample of public and private companies are reported in Table A2. It is easy to see that the significant determinants of audit modifications differ both across modification types and between private and public companies, with the exception of the audit lag (LAG) and the prior year going-concern audit report dummy variable

(GC), which positively increase the likelihood of both modification types in all companies, as expected. The prior year non going-concern audit report dummy variable (NGC) is positively associated with going-concern modifications in both public and private companies, but is only significant in private companies.

Table A2
Estimation Results for Multinomial Model of Audit Reporting

	Private companies		*Public companies*	
Variable	*Non-GC modification*	*GC modification*	*Non-GC modification*	*GC modification*
ln(ASSE)	0.169 **	-0.158	-0.011	-0.463 *
	(0.058)	(0.081)	(0.110)	(0.217)
SUBSID	-0.285	-0.181	-0.354	-0.111
	(0.153)	(0.225)	(0.519)	(0.610)
QUICK	0.038	-1.080 **	0.145	-1.865 *
	(0.059)	(0.229)	(0.094)	(0.746)
GEAR	0.009	0.028 *	0.058 **	-0.059
	(0.013)	(0.013)	(0.022)	(0.057)
LOSS	-0.109	0.785 **	0.462	1.493 *
	(0.217)	(0.219)	(0.536)	(0.609)
CONT	-0.005	0.070 **	0.351	-0.806
	(0.016)	(0.015)	(1.488)	(1.210)
BIG	-0.483 **	0.436	-0.654	0.634
	(0.169)	(0.234)	(0.496)	(0.589)
ln(AF)	-0.150	0.200 *	0.345	0.688
	(0.099)	(0.135)	(0.218)	(0.364)
ln(NAF)	-0.018	-0.020	-0.293	0.196
	(0.080)	(0.095)	(0.138)	(0.209)
LAG	0.002 **	0.003 **	0.003 **	0.005 **
	(0.001)	(0.001)	(0.001)	(0.002)
GC	2.944 **	5.020 **	4.635 **	5.481 **
	(0.283)	(0.265)	(0.800)	(0.929)
NGC	5.476 **	3.097 **	5.569 **	1.967
	(0.165)	(0.271)	(0.462)	(1.143)
DIV	-0.161	-0.519 *	0.646	-0.997
	(0.150)	(0.218)	(0.363)	(0.756)
LIST	-	-	-1.059	-1.885
			(0.647)	(0.980)
constant	-6.126 **	-5.184 **	-6.553 **	-3.679 **
	(0.488)	(0.669)	(1.031)	(1.124)
Observations	6,218		760	
	$F(26, 6{,}192) = 70.41$ **		$F(28, 732) = 11.11$ **	

Notes:
* = statistically significant at the 5% level.
** = statistically significant at the 1% level.
Standard errors are reported in (parentheses).
Coefficients are relative to the base choice of clean report.
Dependent variable is audit report type. Explanatory variables are defined in Table 2.
A 'GC' modification is one which relates to going-concern.

Large private companies are more likely to receive non going-concern related modifications than other private companies, which is consistent with high asset values relative to liabilities increasing the chance of disagreement-type modifications. Private companies choosing Big 6 auditors are significantly less likely to receive non going-concern modifications than other private companies, but, as before, this should not be taken to suggest that Big 6 auditors are lower quality than other auditors, as there may be self-selection bias.

As expected, private companies with high financial risk (GEAR), poor liquidity (QUICK and LOSS), that report material contingent liabilities (CONT) or which do not pay dividends (DIV), are more likely to receive going-concern modifications than other private companies. High audit fees (ln(AF)) in private companies are also associated with going-concern related modifications, suggesting that high audit fees in this context indicate increased audit work.

In contrast, fewer variables are significant in explaining audit modifications in public companies. Public companies with high financial risk (GEAR) are more likely to receive non going-concern related modifications than other public companies. Small public companies, and those with poor liquidity (QUICK and LOSS) are, as expected, more likely to receive going-concern modifications. High audit fees ('ln(AF)') in public companies are also associated with going-concern modifications, suggesting again that high fees in this context indicate increased audit work, although the association is not significant. Similarly, although payment of dividends is negatively associated with going-concern related modifications, it is not significantly so.

Even after controlling for other company characteristics, Tables A1 and A2 show that persistence in audit reporting is highly significant in explaining current year

audit reports (GC and NGC). Table A3 reports persistence among public and private companies in both the estimation and the holdout samples. This information is required to assess the relative performance of the multinomial models in Table A2 against the naïve prediction model. The naïve prediction model consists of predicting the current year audit report type to be equal to the prior year audit report type.

Table A3
Persistence in Audit Reporting

	Prior Year Audit Report			
Current Year	Clean	Non-GC modification	GC modification	Total
Estimation Sample				
Private Companies				
Clean	4,639	47	27	4,713
non-GC modification	327	852	35	1,214
GC modification	114	34	143	291
Total	5,080	933	205	6,218
Public companies				
Clean	625	4	2	631
non-GC modification	39	52	6	97
GC modification	14	2	16	32
Total	678	58	24	760
Holdout Sample				
Private companies				
Clean	1,545	14	11	
non-GC modification	105	289	10	
GC modification	41	10	46	
Total	1,691	313	67	
Public companies				
Clean	209	2	0	211
non-GC modification	15	17	1	33
GC modification	7	0	4	11
Total	231	19	5	255

Notes:
A 'GC' modification is one which relates to going-concern.

From Table A3, we can see that there are 327 first time non going-concern related modifications, and 114 first time going-concern related modifications, among the private companies in the estimation sample. Among the public companies in the estimation sample, there are 39 non going-concern related, and 14 going-concern

related, first time modifications. In the holdout sample, there are 105 first time non going-concern related modifications, and 41 first time going-concern related modifications, among the private companies. Among the public companies in the holdout sample, there are 15 non going-concern related, and 7 going-concern related, first time modifications.

Persistence in audit modifications appears less strong among public companies in the holdout sample than among the other groups of companies, and, as before, less strong in going-concern related modifications in general. The former is likely due to the small number of public companies in the holdout sample; the latter is reasonable as going-concern difficulties are likely to be 'resolved' through bankruptcy in a number of cases, so that repeated modifications become less likely due to sample attrition. These suggest that the multinomial logit model may do better in predicting (particularly going-concern related) modified audit reports in public companies, compared to the naïve model.

To determine whether this is the case, as before the predictive power of the multinomial logit model is compared to that of the standard logit model and the naïve model, this time separately over public and private companies. Table A4a displays the predicted probabilities of non going-concern related audit modifications, and Table A4b displays the predicted probabilities of going-concern related audit modifications. Each Table reports predicted probabilities for the estimation sample in Panel A, and the holdout sample in Panel B. Predicted probabilities for private and public companies are reported separately.

Table A4a
Estimated Probabilities of Non Going-Concern Related Audit Report Modifications

	Actual Audit Report		
	Clean	Non-GC modification	GC modification
Panel A: Estimation Sample			
Private Companies			
Estimated Probability:Mean	0.013	0.453	0.111
Median	0.007	0.597	0.051
Std. Dev.	0.061	0.294	0.193
t-Statistic		95.157	21.583
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		892.496	130.332
P-Value (one-tailed)		0.000	0.000
Number	4,713	1,214	291
Minimum	0.001	0.002	0.000
Maximum	0.810	0.846	0.857
Public Companies			
Estimated Probability:Mean	0.009	0.352	0.104
Median	0.004	0.388	0.045
Std. Dev.	0.038	0.324	0.154
t-Statistic		25.546	10.492
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		70.520	10.696
P-Value (one-tailed)		0.000	0.000
Number	631	97	32
Minimum	0.001	0.001	0.002
Maximum	0.517	0.906	0.610
Panel B: Holdout Sample			
Private Companies			
Estimated Probability:Mean	0.013	0.464	0.103
Median	0.007	0.609	0.031
Std. Dev.	0.055	0.292	0.180
t-Statistic		57.479	12.530
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		276.375	28.536
P-Value (one-tailed)		0.000	0.000
Number	1,570	404	97
Minimum	0.001	0.003	0.000
Maximum	0.721	0.835	0.731
Public Companies			
Estimated Probability:Mean	0.012	0.339	0.086
Median	0.004	0.464	0.006
Std. Dev.	0.069	0.324	0.112
t-Statistic		12.993	3.304
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		10.127	2.391
P-Value (one-tailed)		0.001	0.122
Number	211	33	11
Minimum	0.000	0.001	0.002
Maximum	0.812	0.949	0.249

Notes:
A 'GC' modification is one which relates to going-concern.
t-statistics (χ^2-statistics) test difference between means (medians) of modified and clean report samples.

We can see from Table A4a that the predicted probabilities of non going-concern related audit modifications are on average significantly greater for companies

receiving audit report modifications than for those receiving clean audit reports, in both public and private companies and both the estimation and holdout samples.

This is especially true for companies receiving non going-concern related audit modifications. For these private (public) companies in the estimation sample, the mean predicted probability of receiving a non going-concern related modification is 0.453 (0.352) and the median 0.597 (0.388), compared to 0.111 (0.104) and 0.051 (0.045) for companies receiving going-concern related modifications, and 0.013 (0.009) and 0.007 (0.004) for companies receiving clean audit reports. For these private (public) companies in the holdout sample, the mean predicted probability of receiving a non going-concern related modification is 0.464 (0.339) and the median 0.609 (0.464), compared to 0.103 (0.086) and 0.031 (0.006) for companies receiving going-concern related modifications, and 0.013 (0.012) and 0.007 (0.004) for companies receiving clean audit reports.

From Table A4b, we can see that the predicted probabilities of going-concern related modifications are also on average significantly greater for companies receiving audit report modifications than for those receiving clean audit reports, in both public and private companies and in both the estimation and holdout samples. In particular, for private (public) companies receiving going-concern related modifications in the estimation sample, the mean predicted probability of receiving a going-concern related modification is 0.204 (0.282) and the median 0.078 (0.075), compared to 0.028 (0.024) and 0.012 (0.003) for companies receiving non going-concern related modifications, and 0.004 (0.003) and 0.002 (0.001) for companies receiving clean audit reports. For these private (public) companies in the holdout sample, the mean predicted probability of receiving a going-concern related modification is 0.205 (0.148) and the median 0.088 (0.014), compared to 0.025 (0.020) and 0.011 (0.004)

for companies receiving non going-concern related modifications, and 0.005 (0.003) and 0.002 (0.001) for companies receiving clean audit reports.

The outcome with the highest predicted probability can be assigned as the predicted outcome for each observation. A summary of outcomes predicted in this way from the multinomial logit model, versus actual outcomes, is reported in Panel A of Table A5a for companies in the estimation sample, and in Panel A of Table A5b for companies in the holdout sample.

Panel A in Table A5a (A5b) shows that in the estimation (holdout) sample, using a simple prediction rule based on the predicted probabilities of the different audit report outcomes can result in considerable misspecification of the outcomes, particularly in going-concern audit modifications. For example, in Table A5b we can see that only 16 of the 97 private companies in the holdout sample that receive going-concern related audit modifications are successfully predicted, and only 1 of the 11 public companies in the holdout sample.

Panel B in Tables 8a and 8b reports the percentages of audit report types correctly predicted, for a range of different cut-off probabilities. Reducing the cut-off probability increases the percentage of modified audit reports that are correctly predicted for both company types and for both the estimation and holdout samples, but reduces that of clean audit reports. This is acceptable if the cost of failing to correctly predict an audit modification (a Type I error) sufficiently exceeds that of failing to correctly predict a clean audit report (a Type II error). Panel B in both tables also reports Type I and Type II error rates for the same range of cut-off probabilities.

Table A4b
Estimated Probabilities of Going-Concern Related Audit Report Modifications

	Actual Audit Report		
	Clean	Non-GC modification	GC modification
Panel A: Estimation Sample			
Private Companies			
Estimated Probability:Mean	0.004	0.028	0.204
Median	0.002	0.012	0.078
Std. Dev.	0.023	0.074	0.235
t-Statistic		18.799	54.209
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		656.702	248.547
P-Value (one-tailed)		0.000	0.000
Number	4,713	1,214	291
Minimum	0.000	0.000	0.000
Maximum	0.687	0.868	1.000
Public Companies			
Estimated Probability:Mean	0.003	0.024	0.282
Median	0.001	0.003	0.075
Std. Dev.	0.018	0.064	0.321
t-Statistic		6.594	21.471
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		28.558	29.647
P-Value (one-tailed)		0.000	0.000
Number	631	97	32
Minimum	0.000	0.000	0.000
Maximum	0.355	0.421	0.834
Panel B: Holdout Sample			
Private Companies			
Estimated Probability:Mean	0.005	0.025	0.205
Median	0.002	0.011	0.088
Std. Dev.	0.024	0.060	0.246
t-Statistic		10.739	30.276
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		213.633	55.270
P-Value (one-tailed)		0.000	0.000
Number	1,570	404	97
Minimum	0.000	0.000	0.000
Maximum	0.372	0.604	1.000
Public Companies			
Estimated Probability:Mean	0.003	0.020	0.148
Median	0.001	0.004	0.014
Std. Dev.	0.005	0.055	0.193
t-Statistic		4.576	11.354
P-Value (one-tailed)		0.000	0.000
χ^2-Statistic		2.838	7.748
P-Value (one-tailed)		0.092	0.005
Number	211	33	11
Minimum	0.000	0.000	0.000
Maximum	0.041	0.305	0.558

Notes:
A 'GC' modification is one which relates to going-concern.
t-statistics test difference between means of modified and clean report samples.
χ^2-statistics test difference between medians of modified and clean report samples.

Table A5a
Predictive Power in Estimation Sample

Panel A	Predicted Audit Report			
Actual Audit Report	Clean	non-GC	GC	Total
Private companies				
Clean	4,669	41	3	4,713
non-GC modification	384	819	11	1,214
GC modification	214	31	46	291
Total	5,267	891	60	6,218
Public companies				
Clean	629	2	0	631
non-GC modification	58	38	1	97
GC modification	18	2	12	32
Total	705	42	13	760

Panel B	% Correctly Classified				Type I	Type II
Cut-Off Probability	clean	Non-GC	GC	overall	error rate	error rate
Private companies						
0.2	98.6	70.2	42.6	90.4	0.308	0.014
0.1	98.5	70.2	47.4	90.6	0.296	0.015
0.05	98.4	70.2	48.1	90.5	0.292	0.016
0.025	98.2	70.3	49.1	90.4	0.290	0.018
0.01	86.0	76.7	54.0	82.6	0.207	0.140
Public companies						
0.2	99.0	55.7	43.8	91.2	0.419	0.010
0.1	98.9	56.7	43.8	91.2	0.411	0.011
0.05	98.7	58.8	50.0	91.6	0.364	0.013
0.025	96.8	59.8	53.1	90.3	0.333	0.032
0.01	79.9	69.1	62.5	77.8	0.225	0.201

Panel C	% Correctly Classified				Type I	Type II
Naïve Prediction Rule	clean	Non-GC	GC	overall	error rate	error rate
Private companies	98.4	70.2	49.1	90.6	0.293	0.016
Public companies	99.0	53.6	50.0	91.2	0.411	0.010

Notes:
Panel A reports predicted audit report outcomes equal to the audit report outcome with highest predicted probability, for the estimation sample.
Panel B reports error rates, and the percentage of audit report outcomes correctly predicted in the estimation sample, where the predicted outcome is a non-GC (GC) modification if the predicted probability of a non-GC (GC) modification exceeds both the cut-off probability and the predicted probability of a GC (non-GC) modification, and a clean report otherwise. A Type I error is defined as classifying a modified audit report as clean, and a Type II error is defined as classifying a clean audit report as modified.
Panel C reports comparative figures to Panel B, based on the alternative naive prediction rule 'predicted audit report outcome is equal to prior year audit report'.

Table A5b
Predictive Power in Holdout Sample

Panel A	Predicted Audit Report			
Actual Audit Report	Clean	non-GC	GC	Total
Private companies				
Clean	1,557	13	0	1,570
non-GC modification	124	278	2	404
GC modification	71	10	16	97
Total	1,752	301	18	2,071
Public companies				
Clean	209	2	0	211
non-GC modification	17	16	0	33
GC modification	10	0	1	11
Total	236	18	1	255

Panel B	% Correctly Classified				Type I	Type II
Cut-Off Probability	clean	Non-GC	GC	overall	error rate	error rate
Private companies						
0.2	98.6	71.5	41.2	90.6	0.305	0.014
0.1	98.5	71.8	45.4	90.8	0.293	0.015
0.05	98.3	71.8	45.4	90.6	0.291	0.017
0.025	98.0	72.0	46.4	90.5	0.287	0.020
0.01	85.9	77.2	52.6	82.6	0.218	0.141
Public companies						
0.2	99.1	54.5	27.3	90.2	0.500	0.009
0.1	99.1	54.5	36.4	90.6	0.477	0.009
0.05	99.1	54.5	36.4	90.6	0.455	0.009
0.025	98.1	54.5	36.4	89.8	0.409	0.019
0.01	79.1	57.6	63.6	75.7	0.250	0.209

Panel C	% Correctly Classified				Type I	Type II
Naïve Prediction Rule	clean	Non-GC	GC	overall	error rate	error rate
Private companies	98.4	71.5	47.4	90.7	0.291	0.016
Public companies	99.1	51.5	36.3	90.2	0.500	0.009

Notes:
Panel A reports predicted audit report outcomes equal to the audit report outcome with highest predicted probability, for the holdout sample.
Panel B reports error rates, and the percentage of audit report outcomes correctly predicted in the holdout sample, where the predicted outcome is a non-GC (GC) modification if the predicted probability of a non-GC (GC) modification exceeds both the cut-off probability and the predicted probability of a GC (non-GC) modification, and a clean report otherwise. A Type I error is defined as classifying a modified audit report as clean, and a Type II error is defined as classifying a clean audit report as modified.
Panel C reports comparative figures to Panel B, based on the alternative naive prediction rule 'predicted audit report outcome is equal to prior year audit report'.

Note that Type I and Type II errors do not distinguish between different types of audit modification, so that a Type I error corresponds to predicting that a modified audit report is clean, and a Type II error corresponds to predicting that a clean audit report is modified. Type I errors decrease as the cut-off probability is reduced; Type II errors increase.

Comparative figures for the naïve alternative strategy are reported in Panel C of Tables 8a and 8b. The multinomial model with a cut-off probability of 0.025 correctly predicts substantially more audit modifications for public companies than the naïve alternative strategy, in both the estimation and holdout samples. With a cut-off probability of 0.01, the multinomial model correctly predicts substantially more audit modifications for both public and private companies, in both the estimation and holdout samples.

The prediction error costs from the multinomial logit model are now compared to those from the naïve prediction rule and from using the standard logit model (coefficient estimates reported in Table A1). The relative prediction error costs for the holdout sample are reported in Table A6, for a range of relative costs of Type I and Type II errors. Note that in line with the previous research, Type I errors are believed to be more costly than Type II errors.

For each level of relative Type I and Type II error costs, the cut-off probability is chosen so as to minimise error costs in the estimation sample. Type I and Type II error rates are reported for each cut-off probability. For sufficiently high relative error costs, the multinomial model of audit reporting results in lower misclassification costs than either the naïve strategy, or the standard logit model. However, the improvements are marginal, particularly over the standard logit model.

Table A6
Misclassification Costs and Errors in the Holdout Sample

Relative Costs of Type I and Type II Errors	Cut-Off Probability which Minimises Model Error Costs in *Estimation* Sample	Type I Error Rate in Holdout Sample	Type II Error Rate in Holdout Sample	Cost of Model Errors Relative to Cost of Errors from Naïve Prediction Rule*	Cost of Model Errors Relative to Cost of Errors from Dichotomous Logit Model**
Private Companies					
1:1	0.2935	0.333	0.013	0.994	1.022
5:1	0.0525	0.291	0.017	1.011	1.011
10:1	0.0310	0.287	0.018	0.997	0.996
15:1	0.0146	0.267	0.045	1.010	0.943
20:1	0.0145	0.265	0.045	0.983	0.966
Public Companies					
1:1	0.2450	0.523	0.009	1.047	1.047
5:1	0.0485	0.455	0.009	0.916	0.958
10:1	0.0204	0.409	0.043	0.914	0.987
15:1	0.0204	0.409	0.043	0.883	0.991
20:1	0.0204	0.409	0.043	0.867	0.993

Notes:
* = the alternative naïve prediction rule is to predict audit reports equal to the prior year audit report. Error rates are reported in Table 8b.
** = error rates, using the coefficients from the dichotomous logit model of audit reporting estimated over the estimation sample to predict modified audit reports in the holdout sample, are as follows:

Relative Cost of Errors	Cut-Off Probability	Type I Error Rate	Type II Error Rate
Private Companies			
1:1	0.2935	0.305	0.014
5:1	0.0525	0.291	0.016
10:1	0.0310	0.283	0.022
15:1	0.0146	0.244	0.090
20:1	0.0145	0.244	0.091
Public Companies			
1:1	0.2450	0.500	0.009
5:1	0.0485	0.477	0.009
10:1	0.0204	0.409	0.047
15:1	0.0204	0.409	0.047
20:1	0.0204	0.409	0.047

A Type I error is defined as classifying a modified audit report as clean, and a Type II error is defined as classifying a clean audit report as modified.
Error costs are calculated assuming the proportion of modified audit reports α in the population is 0.067. Error costs are $\alpha \times$(Type I error rate)$\times$(Relative Type I error cost) + $(1 - \alpha) \times$(Type II error rate)$\times 1$.
Relative error costs are the ratio of the error costs for the multinomial logit model to those for the alternative strategy/model.

Even at the high relative cost of Type I to Type II errors of 20:1 and the corresponding cut-off probabilities of 0.0145 (0.0204) for private (public) companies, misclassification costs generated by the multinomial model are 96.6% of those generated by the standard logit model for private companies, and 99.3% of those for public companies.

Appendix B

THE EFFECTS OF TRANSFORMATIONS ON AUDIT FEE RESIDUALS

In this Appendix I consider three different model specifications, as follows:

1. Untransformed dependent and explanatory variables.

2. Log-transformed dependent, size, complexity and gearing variables.

3. Rank-transformed dependent, size, complexity and gearing variables, as reported in the body of the chapter.

I simulate residuals for each specification using results obtained from the estimation of the 'traditional' audit fee regression model as in Eq. (3.1). In other words, the model is estimated over all companies in the sample and includes the auditor size dummy variable BIG_i among the explanatory variables. For example, the residuals plotted in Graphs 3.1 and 3.2 are obtained from the results of the estimation reported in Column 1, Table 4.

The explanatory variables which are log-transformed in specification (2) above are precisely those which have a skewed distribution as identified in the descriptive statistics of Table 2. Specification (3) is identical to that employed in the chapter. The transformed explanatory variables are assets employed (ASSE) and sales turnover (REV), number of SIC codes (SIC), number of domestic and overseas subsidiaries (DS and OS), and capital gearing (GEAR).

In order to make log transformations of variables which take zero or negative values (such as ASSE), a constant is first added to each observation of the variable. The constant is the smallest integer which, when added to each observation of the variable, renders all observations of that variable greater than zero.

Both histogram plots of residuals and scatter plots of residuals against fitted values are reported here. Graphs 1.1 and 1.2 relate to specification (1) above, using

untransformed variables, Graphs 2.1 and 2.2 relate to specification (2) using log-transformed variables, and Graphs 3.1 and 3.2 relate to specification (3) using rank-transformed variables. The results of the estimations of the 'traditional' audit fee regression models are also reported in each case.

It is clear from the residuals plots that specification (3), using rank-transformations, produces the closest to normally-distributed residuals. Log-transformations also improve the normality of the residuals, although to a lesser degree, but require somewhat arbitrary manipulation of the observations before the transformation ca be applied.

Specification 1

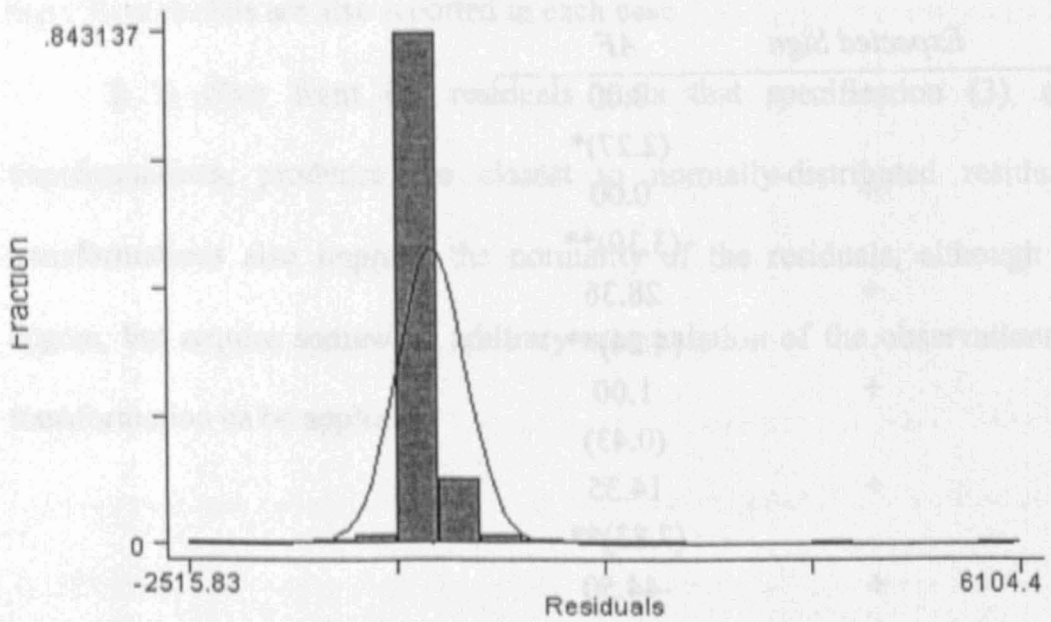
Residuals for the 'traditional' audit fee model, untransformed variables.

Table B1
Estimation results (t-statistics in parentheses)

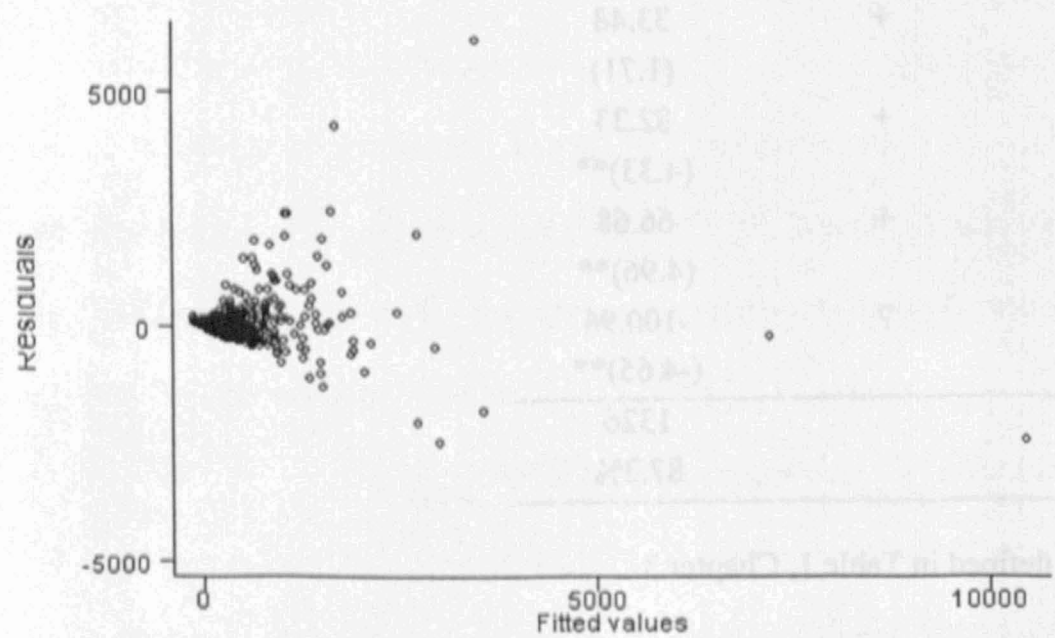
Variable	*Expected Sign*	*AF*
ASSE	+	0.00
		(2.27)*
REV	+	0.00
		(3.39)**
SIC	+	28.36
		(4.24)**
DS	+	1.00
		(0.43)
OS	+	14.35
		(7.83)**
LOSS	+	-44.50
		(-3.356)**
GEAR	+	-0.00
		(-0.10)
BUSY	+	33.48
		(1.71)
LON	+	82.33
		(4.33)**
BIG	+	66.68
		(4.96)**
CONSTANT	?	-100.96
		(-4.65)**
Observations		1326
R^2		87.3%

Notes:
Variables are defined in Table 1, Chapter 3.

Graph 1.1. Distribution of fitted residuals from 'traditional' audit fee model, using untransformed variables



Graph 1.2. Relation between fitted residuals and fitted values of 'traditional' audit fee model, using untransformed variables



Specification 2

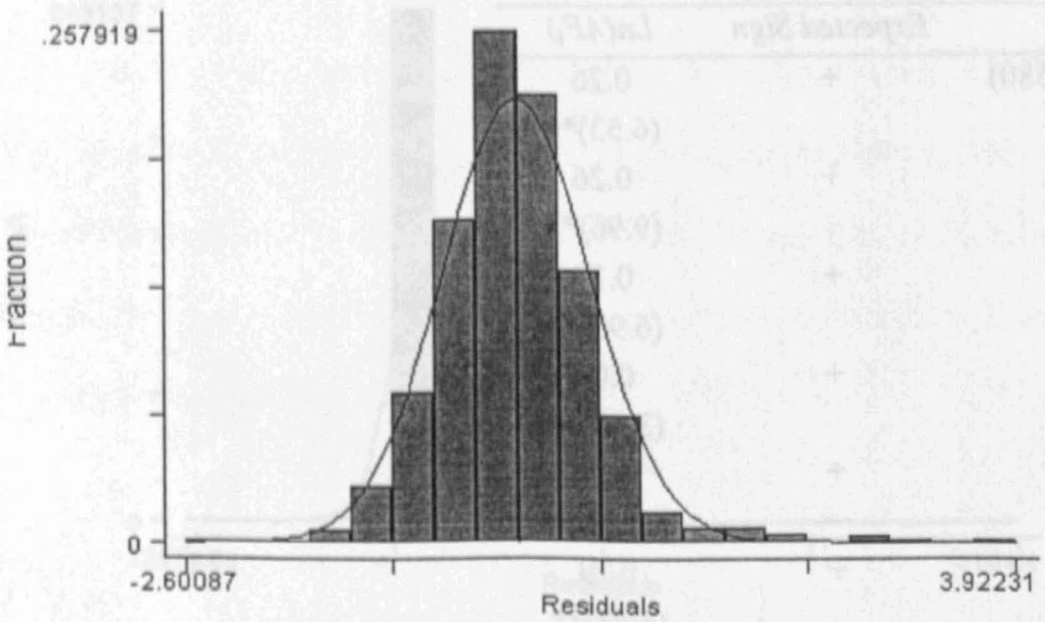
Residuals for the 'traditional' audit fee model, log-transformed variables.

Table B2
Estimation results (t-statistics in parentheses):

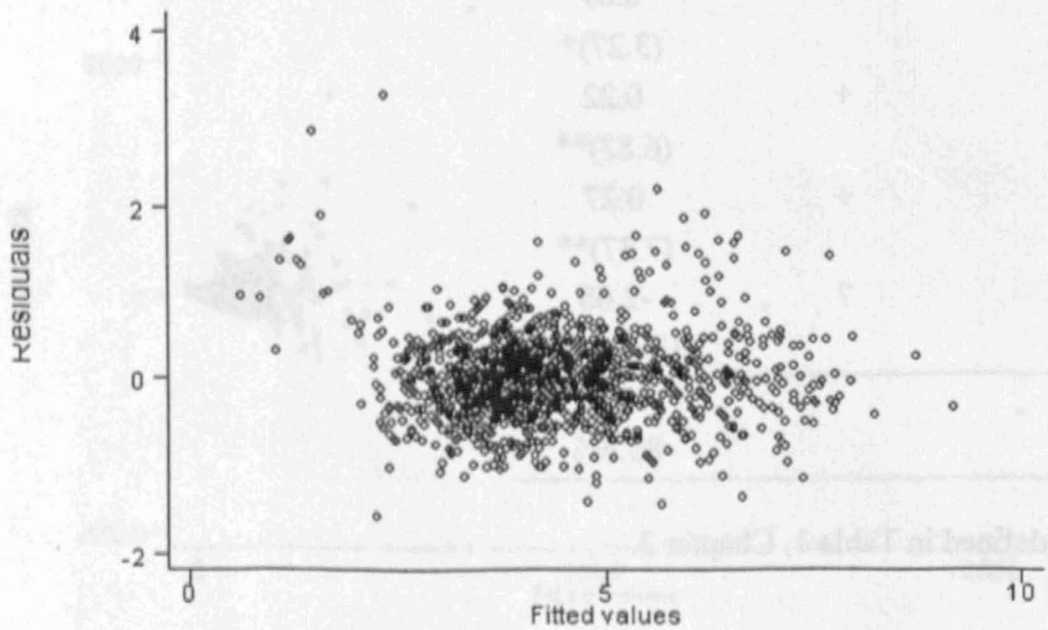
Variable	*Expected Sign*	$Ln(AF_i)$
ln(*ASSE*+13580)	+	0.26
		(6.53)**
ln(*REV*+1)	+	0.26
		(9.96)**
ln(*SIC*)	+	0.17
		(6.90)**
ln(*DS*+1)	+	0.09
		(3.98)**
ln(*OS*+1)	+	0.29
		(17.20)**
LOSS	+	0.19
		(5.43)**
ln(*GEAR*+4553)	+	-0.02
		(-3.68)**
BUSY	+	0.09
		(3.27)*
LON	+	0.22
		(6.82)**
BIG	+	0.27
		(7.37)**
CONSTANT	?	-2.08
		(-7.94)**
Observations		1326
R^2		85.6%

Notes:
Variables are defined in Table 1, Chapter 3.

Graph 2.1. Distribution of fitted residuals from 'traditional' audit fee model, using log-transformed variables



Graph 2.2. Relation between fitted residuals and fitted values of 'traditional' audit fee model, using log-transformed variables

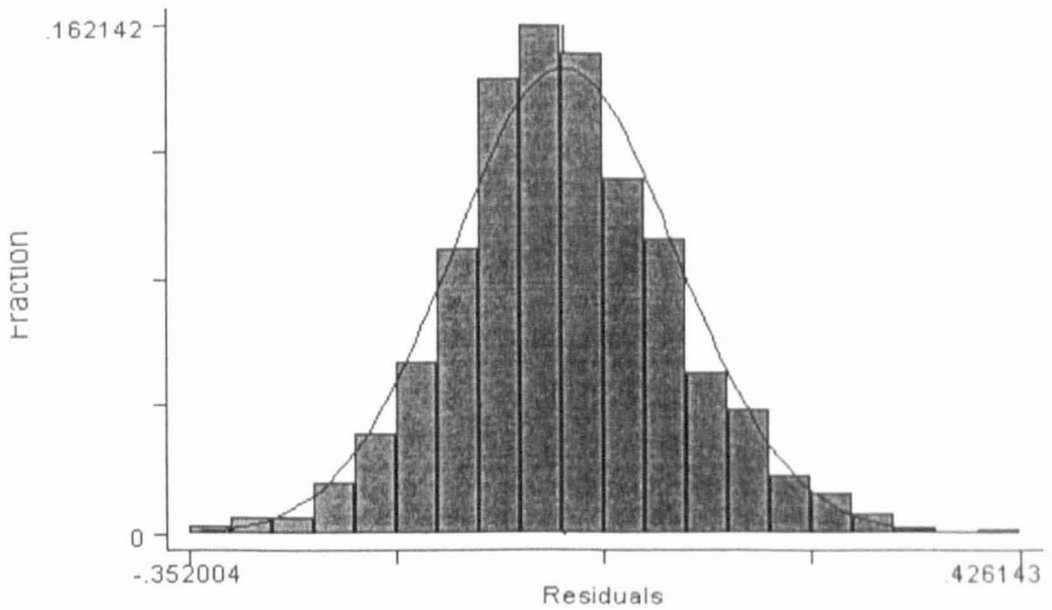


Specification 3

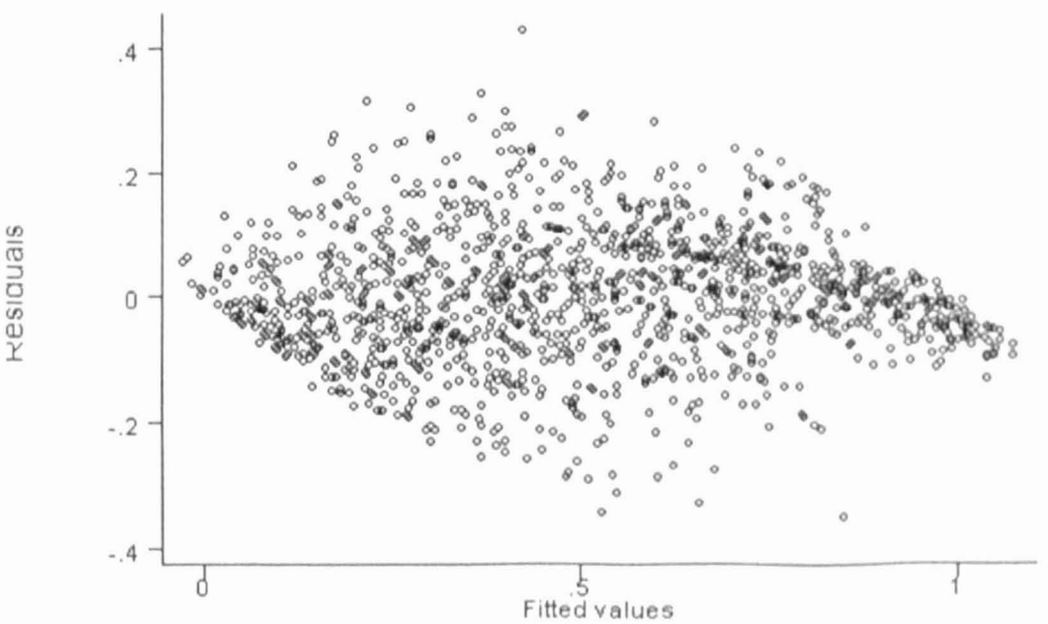
Residuals for the 'traditional' audit fee model, rank-transformed variables.

Estimation results as Col. (1), Table 4.

Graph 3.1. Distribution of fitted residuals from 'traditional' audit fee model, using rank-transformed variables



Graph 3.2. Relation between fitted residuals and fitted values of 'traditional' audit fee model, using rank-transformed variables



Appendix C

DETAILS OF ESTIMATION OF DISCRETIONARY ACCRUALS

The model and method used for estimating discretionary accruals are described in detail in Chapter 4. Tables B1 and B2 give descriptive statistics for the variables used to estimate the discretionary accruals, and the estimated model coefficients, respectively.

Table C1
Estimating DA – Descriptive Statistics of Variables by Industry

Variable	*Mean*	*Median*	*Standard Deviation*	*Min*	*Max*
Mineral Extraction					
TA_t / A_{t-1}	0.020	-0.031	0.230	-0.272	0.787
$1 / A_{t-1}$	0.000	0.000	0.000	0.000	0.001
$\Delta REV_t / A_{t-1}$	0.202	0.061	0.464	-0.224	1.626
$\Delta REC_t / A_{t-1}$	0.078	0.007	0.214	-0.050	0.875
PPE_t / A_{t-1}	1.012	0.847	1.058	0.116	6.155
Estimated DA	-0.035	-0.064	0.196	-0.344	0.676
General Industrials					
TA_t / A_{t-1}	-0.049	-0.059	0.263	-1.577	1.138
$1 / A_{t-1}$	0.000	0.000	0.000	0.000	0.008
$\Delta REV_t / A_{t-1}$	0.219	0.090	1.288	-8.009	11.623
$\Delta REC_t / A_{t-1}$	0.037	0.010	0.317	-2.301	2.672
PPE_t / A_{t-1}	0.556	0.508	0.380	0.011	3.266
Estimated DA	-0.016	-0.015	0.246	-1.416	1.208
Consumer Goods					
TA_t / A_{t-1}	-0.053	-0.049	0.261	-1.645	1.683
$1 / A_{t-1}$	0.000	0.000	0.000	0.000	0.003
$\Delta REV_t / A_{t-1}$	0.148	0.070	1.371	-10.434	9.404
$\Delta REC_t / A_{t-1}$	0.044	0.005	0.243	-0.411	2.104
PPE_t / A_{t-1}	0.759	0.693	0.461	0.055	3.814
Estimated DA	0.024	0.014	0.205	-0.565	1.117
Services					
TA_t / A_{t-1}	-0.169	-0.054	2.997	-57.762	3.691
$1 / A_{t-1}$	0.000	0.000	0.000	-0.002	0.006
$\Delta REV_t / A_{t-1}$	0.863	0.194	2.596	-2.698	25.281
$\Delta REC_t / A_{t-1}$	0.038	0.029	3.059	-57.866	7.374
PPE_t / A_{t-1}	0.886	0.693	2.624	-1.674	50.061
Estimated DA	0.649	0.618	1.138	-15.414	5.628

Wholesale Trade					
TA_t / A_{t-1}	0.047	-0.019	0.360	-0.832	2.029
$1 / A_{t-1}$	0.000	0.000	0.001	-0.006	0.002
$\Delta REV_t / A_{t-1}$	0.953	0.324	2.375	-2.604	19.374
$\Delta REC_t / A_{t-1}$	0.195	0.063	0.584	-0.685	4.909
PPE_t / A_{t-1}	0.549	0.379	1.170	-0.012	12.255
Estimated DA	0.012	-0.022	0.308	-1.266	1.574
Real Estate					
TA_t / A_{t-1}	0.529	-0.050	3.815	-5.873	16.098
$1 / A_{t-1}$	0.000	0.000	0.001	0.000	0.004
$\Delta REV_t / A_{t-1}$	0.261	0.000	0.620	-0.147	2.573
$\Delta REC_t / A_{t-1}$	1.907	0.023	8.766	-2.242	40.085
PPE_t / A_{t-1}	0.826	0.034	3.394	0.000	15.630
Estimated DA	-2.689	0.044	12.818	-58.549	2.122

Table C2
Estimating DA – Eq. (1) Fitted Coefficients by Industry

Industry	$\hat{\alpha}$	$\hat{\beta}_1$	$\hat{\beta}_2$	R^2	*No. Obs.*
Mineral Extraction	-25.535	0.214	0.031	36.4%	30
General Industrials	35.472	0.090	-0.095	23.3%	383
Consumer Goods	-270.017	0.102	-0.076	46.7%	131
Services	136.499	0.144	-1.079	87.1%	380
Wholesale Trade	88.881	0.080	-0.054	34.9%	111
Real Estate	-455.114	-1.461	1.152	93.9%	21
Total					1,056

Notes:
Variables are defined in Section 2.
There are 30 companies in the Mineral Extraction industry group, 383 in General Industrials, 131 in Consumer Goods, 380 in Services, 111 in Wholesale Trade, and 21 in Real Estate. 8 of the companies are missing BIG, 10 are missing NEX, and 1 is missing OS. These 19 companies are therefore dropped from the subsequent regressions.